THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XV. No. 362—18th YEAR.] LONDON, SEPTEMBER 4, 1866. [Subscription per Ann. 15s. in Advance / 18s. Credit.] Price 8d. Unstamped.

RAMSAY'S NEWCASTLE CANNEL
COAL. Analysis by Dr. FYFE, M.D.:—
9746 cubic feet of gas per ton of coal.
26-candle gas.
13¼ cwt. coke per ton of coal.
N.B.—Ramsay's Cannel most resembles the Marquis of Lothian's Cannel, but superior as to coke.
RAMSAY'S PATENT CONDENSED COKE,
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828.
FIRE-BRICK WORKS, established 1804.
FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire Clay.
The Fire Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article.
The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the works are the most extensive in the Kingdom.
Manufactories: DERWENTHAUGH, SWALWELL, and HEBBURN QUAY. Offices: BROAD CHARE, NEWCASTLE-UPON-TYNE. Address, G. H. RAMSAY.

IMPROVED GASLIGHT.

Most of the complaints made of deficiency of gaslight, and bad gas, arise from the unskilful combustion of the gas, and especially from the employment of bad burners. The atmosphere is thus rendered offensive and unwholesome, and becomes charged with smoke—an inconvenience that is especially felt in *churches, theatres,* and *public offices.*
By using proper burners, regulating the pressure, and *carburetting* the gas, it will be rendered the cheapest and most wholesome artificial light that can be used.
CARLESS, BLAGDEN, and Co., having been for many years practically engaged in manufacturing every variety of substance used for the production of artificial light, have for some time specially directed their attention to the subject of *carburetting* gas.
In conjunction with GEO. GLOVER and Co., an extensive series of experiments have been conducted with the greatest care, and by means of instruments of the highest scientific precision; and the result of their united efforts is, that the fluid and apparatus have been so improved as to give a real commercial value to the process of *carburetting* common gas. The most important result to be obtained from this process is that the light can be *doubled or trebled,* and that for an equal amount of light the production of heat and carbonic acid gas will be greatly reduced, even to less than the quantity produced by wax candles and oil-lamps.
Messrs. GEO. GLOVER and Co. will have pleasure in showing the apparatus in use, and in giving any explanation that may be desired. Architects, engineers, and scientific men generally, are specially invited.
For list of prices, and all other information, apply to
GEO. GLOVER and CO.,
WORKS, RANELAGH ROAD, PIMLICO, S.W.; or,
CARLESS, BLAGDEN, and CO.,
2, NEW LONDON STREET, E.C.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE-CLAY," and they have also been awarded in the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL AND CO.,
THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY;
ALMA WORKS,
WALSALL, STAFFORDSHIRE;
and 69, UPPER THAMES STREET, LONDON,
Original Manufacturers of Wrought-Iron Gas Tubes and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.
Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.
N.B. All Goods thoroughly Tested before sent out, and Warranted.

CLEGG'S TREATISE ON COAL GAS.
The Fourth Edition is NOW IN COURSE OF DELIVERY. Subscribers whose names have been sent to the Office of the JOURNAL OF GAS LIGHTING are requested to remit the amount of their subscription per Post Order, payable to WILLIAM B. KING, 11, Bolt Court, Fleet Street, LONDON.
If the Volume is required to be sent into the country, the subscription (15s.) should be accompanied with the further sum of 6d. to pay for securely packing and booking the same. The price to Non-Subscribers is 21s.

BLAYDON BURN AND LOW BENWELL FIRE CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.
WILLIAM COCHRAN CARR begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.
London Agents: JAMES LAWRIE & CO., 63, OLD BROAD STREET, CITY, LONDON.

THE "LOTHIAN" CANNEL COALS.
These Cannels are extensively used in the Gas-Works of Edinburgh, where the illuminating power of the gas is the highest in Britain.
The yield per ton is **12,573** cubic feet; illuminating power 33·8 standard candles; coke per ton 1046 lbs.
Ports of Shipment, in the Firth of Forth.

AYRSHIRE CANNEL COALS.
These Cannels are used in Glasgow, Greenock, Paisley, and other Gas-Works on the West Coast of Scotland.
The yield per ton is **10,650** cubic feet; illuminating power 24 standard candles; coke per ton 1216 lbs.
Ports of Shipment, in the Firth of Clyde.
For prices and other information, apply to Mr. JOHN ROMANS, C.E., 53, Frederick Street, EDINBURGH.

Established A.D. 1782. Prize Medal Holders.
WILLIAM BLEWS AND SONS,
9, 10, 11, and 12, NEW BARTHOLOMEW STREET,
BIRMINGHAM;
AND 38, WEST SMITHFIELD, LONDON;
PATENTEES AND MANUFACTURERS OF
METAL AND GLASS CHANDELIERS, &c.,
IN THE PUREST STYLE OF ART. Also of
IRON TUBES AND FITTINGS,
FOR GAS STEAM, AND WATER;
Steam and other Cocks in Gun-Metal and Brass; Stocks, Taps, and Dies; Gas-Hooks and Burners; Brass, Copper, and Composition Tubes; and every article required in the erection of Gas-Works.
ALL WARRANTED.

MEDAL AWARDED, EXHIBITION, 1862, "FOR GOOD WORK."
THE IMPERIAL TUBE COMPANY, BIRMINGHAM,
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS, BRASS & COPPER TUBES,
GALVANIZED & GLASS ENAMELLED TUBES & FITTINGS,
LAP-WELDED IRON & BRASS BOILER-TUBES, ETC., ETC.
☞ Sole Makers of "HUGHES'S PATENT TAPS," Strongly recommended for all High-pressure purposes.—Price List and Testimonials forwarded on application.

THE UNVARYING WATER-LINE GAS-METER.
(SANDERS & DONOVAN'S PATENT.)
"Unquestionably the best Water Gas-Meter now in use."
MANUFACTURERS:
THE GAS-METER COMPANY, KINGSLAND ROAD, LONDON;
WITH
Branch Manufactories at DUBLIN and OLDHAM.

NOW READY,

VOL. XIV. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1866, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., V., VI., VII., VIII., IX., X., XI., XII., and XIII. are still on sale.

W. B. KING, 11, Bolt Court, FLEET STREET, E.C.

GAS LEGISLATION, 1866.

Now ready,

Reports of the Proceedings before Select Committees of Parliament.

ALDRINGTON, HOVE, AND BRIGHTON GAS, and **BRIGHTON AND HOVE GENERAL GAS BILLS**—price 2s., by post 2s. 1d.

SHEFFIELD UNITED GAS BILL—price 1s., by post 1s. 1d.

WANDSWORTH AND PUTNEY GAS BILL—price 1s., by post 1s. 1d.

IMPERIAL AND EQUITABLE GAS BILL—price 1s., by post 1s. 1d.

CHATHAM, ROCHESTER, &c., GAS BILL—price 1s., by post 1s. 1d.

HEATH, BRYNMAWR, & WORKSOP GAS BILL—price 2s., by post 2s. 1d.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

RATING OF GAS & WATER PIPES.

Now ready, price 2s., per post 2s. 1d.,

REPORT of the Appeal of the PHŒNIX GAS COMPANY *v.* LEE (West Kent Quarter Sessions, January, 1865), with the Special Case thereon, and Judgment of the Court of Queen's Bench.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

EIGHTH THOUSAND.

AGRICULTURAL VALUE OF REFUSE GAS LIME.

BY PROFESSOR VOELCKER,
Professor of Chemistry to the Royal Agricultural Society of England.

Price 10s. per 100, or by post, 10s. 6d.

London: WILLIAM B. KING, 11, Bolt Court, FLEET STREET, E.C.

D. GRANT & CO.,

GAS-METER MANUFACTURERS

(Stamped according to the Sale of Gas Act).

STATION-METERS ANY SIZE.

PHOTOMETERS, EXPERIMENTAL METERS,

PRESSURE-GAUGES, &c.

Price List on application.

GAS-METER WORKS, CROSSCAUSWAY, EDINBURGH.

JAMES OAKES and CO.,

ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD,
CITY ROAD, LONDON,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water-Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

LAMBERT BROTHERS,

WALSALL,

MANUFACTURERS OF GAS TUBES & FITTINGS,

BRASS GAS JOINTS, BRACKETS, PENDANTS, &c.

TUBE CUTTER.

Number One, 12s.

TO INVENTORS AND PATENTEES.

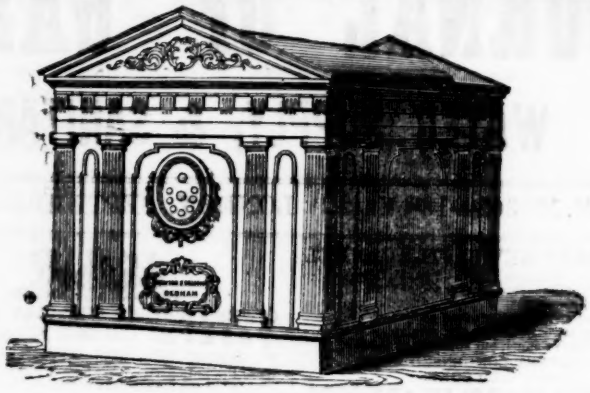
MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the advertiser, 42, Parliament Street, WESTMINSTER. [Office of the JOURNAL OF GAS LIGHTING, &c.]

GLOBE METER-WORKS.

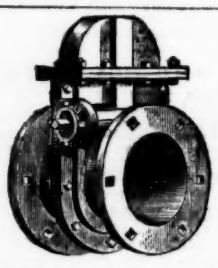


NEWTON & BRADDOCK,

MANUFACTURERS OF

STATION METERS, CONSUMERS METERS, &c.,

OLDHAM.



REDUCED PRICES OF

BRYAN DONKIN & CO.'S

IMPROVED GAS VALVES

WITH WROUGHT-IRON PINIONS

from 2 inches to 18 inches, price 9s. 6d. to 12s. per inch diameter

List of prices, with full dimensions of all sizes up to 36 inches, to be had on application.

These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.

Valves made with Outside Racks to order. Also, Screw Water-Valves with Gun-Metal Faces.

BRYAN DONKIN & CO.,
ENGINEERS,
NEAR GRANGE ROAD, BERMONDSEY.

F. & C. OSLER,

45, OXFORD STREET, LONDON;

Manufactory—Broad Street, Birmingham—Established 1807,

MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.

ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards (Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of Gas in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.

THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

JOSEPH BOULTON,

80, KING'S CROSS ROAD, AND
10½, GREAT PERCY STREET, CLERKENWELL.

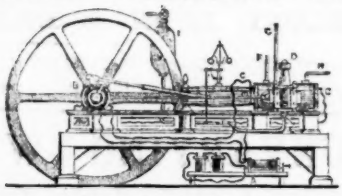
Manufacturer of the Patent Dry and Improved Unvarying Water-Line Gas-Meters and Station-Meters, Governors, Experimental Meters, and Pressure Gauges, on the most improved principle.

Old Meters thoroughly repaired, and altered to meet the requirements of the Act of Parliament.

ALL METERS WARRANTED.

FREEDOM FROM SMOKE.

POWER WITHOUT RISK.



THE GAS-ENGINE COMPANY,

LIMITED,

Beg to announce that they are ready to supply GAS-ENGINES of the following powers: half-horse power, one-horse power, two-horse power, three-horse power.

They are simple in construction, free from danger, and require no special attendant.

The Insurance Offices do not increase their rates, therefore the Engines can be used where steam would be inadmissible.

A large number are employed in London and provincial towns, for the purpose of sawing, pumping, working warehouse lifts, and driving all classes of machinery, such as printing-presses, soda-water machines, bottle-washing, hair-brushing, biscuit and confectionery machinery.

Prices and full particulars may be obtained either by post or personal inquiry, at the Office, 92, CANNON STREET, LONDON, E.C., and an Engine can be seen in work at the Factory, 4, VINE STREET, LAMBETH, S.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

This Paint having been in general use over four years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (28s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs under 20s. per cwt., as compared with White Lead at 28s. per cwt.

THE GAS-METER COMPANY

(LIMITED), LONDON,

(Successors to CROLL, RAIT, and CO., LONDON, and WEST and GREGSON, OLDHAM.)

MANUFACTURE

STATION-METERS & GOVERNORS

At their Oldham Establishment, which has long possessed the reputation of supplying this description of apparatus of the most perfect construction and appropriate design.

CONSUMERS GAS-METERS IN CAST-IRON & TINNED SHEET-IRON CASES.

STREET GOVERNORS, PRESSURE and EXHAUST REGISTERS, TEST GASHOLDERS,

AND EXPERIMENTAL GAS APPARATUS GENERALLY.

For information, &c., apply to

W. ARCHER, Manager, Meter Factory, OLDHAM;

OR TO

GEORGE RAIT, Managing Director, KINGSLAND ROAD, LONDON.

NATURAL OXIDE OF IRON.

Messrs. W. DAWBER & SON,

QUEEN'S DOCK, HULL,

Who with several Gas Companies successfully opposed the prolongation of Mr. F. C. Hills's Patent for the Purification of Gas by Artificial Oxide of Iron, respectfully inform Directors of Gas Companies, Gas Engineers, and all interested in using the cheapest and most effectual material for the Purification of Gas, that they are now prepared to supply the NATURAL OXIDE OF IRON at a price per ton delivered, or to take Contracts by the ton of coal carbonized, receiving back the spent material.

References to several London and provincial Gas Engineers of the highest eminence can be given on application to W. DAWBER & SON, to whom all orders should be addressed.

Queen's Dock, Hull, March 28, 1864.

WARNER'S

PATENT ANHYDROUS OXIDE OF IRON

Purifies Gas from Sulphuretted Hydrogen, Carbonic Acid, Bisulphide of Carbon, and Ammonia. The Hydrogen liberated through the decomposition of the Ammonia unites with the excess of carbon, giving increased brilliancy and yield of Gas with less smoke and no Naphthaline.

PRECIPITATED OXIDE OF IRON,

Prepared by the process as patented by Mr. Hills, supplied where preferred.

WARNER'S SILICATE OF IRON PAINT.

The peculiarities and advantages of this Paint are that it will stand extreme heat and damp, and is not affected by the strongest Acid, Sea Water, Sulphuretted Hydrogen, or Ammonia. It is equally well adapted for Iron, Wood, or Cement. Every shade of Colour ground to order. The LIGHT STONE COLOUR will retain its SOFT DELICATE SHADE regardless of the fumes of Gases. IT HAS NO SMELL, and there is an entire absence of deleterious effect.

THE SILICATE OF IRON POWDER, when boiled up with Tar and Lime, is a very cheap preservative for Iron, Wood, and Felt Roofing, and is recommended for Gasholders which have been coated with Tar.—Price £8 8s. per ton.

A. WARNER, 17, Laurence Pountney Lane, London, E.C.

TO CORPORATIONS, GAS ENGINEERS, AND OTHERS.

HENRY ALDER,

GRANGE METER-WORKS, EDINBURGH,

Begs to intimate that he has introduced the manufacture of DRY GAS-METERS in

CAST-IRON CASES.

These Meters are protected by registration under the "Copyright of Designs Act." They are much more durable, and at the same time more easily repaired than those in Tin Cases.

Price list and terms on application.

ANOTHER

MEDAL AWARDED BY THE JURY, INTERNATIONAL EXHIBITION,

1862,

To THOMAS GLOVER,

SUFFOLK STREET, CLERKENWELL GREEN, LONDON.

THOMAS GLOVER has great pleasure in informing Gas Companies and his other Patrons, that the *Jury of Class XXXI. of the International Exhibition of* 1862 have awarded, for his Patent Dry Gas-Meter, *a Prize Medal.* The reason given for this Award, in the Juries Official Report, is, "*For excellence of manufacture, as regards Dry Meters.*" See Official Report, p. 346.

It is worthy of remark, that the only two other Firms who receive Awards *both manufacture imitations of Thomas Glover's* Patent Dry Gas-Meter, and the reason given for these Awards is "*construction* and sound workmanship." Thomas Glover, therefore, claims that the *construction* of his Meter has obtained *three Awards from the Jury of the International Exhibition of* 1862; at the same time, *contrasting* the Award granted for his Meter by the words, "*For excellence of manufacture, as regards Dry-Meters.*"

The Prize Meter was exhibited in Class XXXI., No. 6301, connected with a 1-foot holder, to demonstrate that a 50-light Meter *measures and indicates accurately the small quantity of One Foot.*

WILLIAM PARKINSON AND CO.

(SUCCESSORS TO SAMUEL CROSLEY),

PATENT WET AND DRY GAS-METER MANUFACTURERS, &c.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

PATENT IMPROVED WET METER.

W. P. and Co. invite especial attention to this Meter, which entirely overcomes the difficulty to which ordinary Wet Meters are subjected, owing to the short range of the Float, which is necessary, in order to meet the requirements of the Sale of Gas Act.

"It is well known that n Meters constructed so that the valve will close when the water is drawn off to such a point as to render them 3 per cent. slow the lights are liable to be extinguished by the closing of the valve by a sudden increase of pressure. To meet this difficulty, Mr. Pinchbeck has invented an ingenious and simple arrangement by which the action is reversed, and any such increase of pressure, in his Meter, raises the value instead of depressing it. The fact of the improvement having been adopted by Messrs. W. Parkinson and Co. is a sufficient guarantee that it practically and effectually remedies the inconvenience it is designed to meet."—JOURNAL OF GAS LIGHTING.

PATENT IMPROVED DRY METER,

Which W. P. and Co. pledge themselves to manufacture with the same quality of materials and workmanship as in their Wet Meter, thereby giving Gas Companies and others the advantage of procuring a first-rate Dry as well as a Wet Meter, which, hitherto, they have been unable to do.

STATION-METERS AND GOVERNORS.

Which can be seen at all the London Gas-Works. Also Liverpool, Manchester, Sheffield, Nottingham, Belfast, Glasgow, Birmingham, Dublin, Bristol, Leeds, Leicester, Brighton, Southampton, Sunderland, Wolverhampton, Bradford, Norwich, &c., &c.

TEST GASHOLDERS, EXPERIMENTAL METERS, EXHAUSTER REGULATORS,

MINUTE CLOCKS, PRESSURE GAUGES, PHOTOMETERS, PRESSURE REGISTERS, &c.

CONTENTS.

Notes upon Passing Events:— PAGE

The Metropolitan Water Supply . . . 669
Military Education . . . 669
The British Association and the Darwinian Theory . . . 670
Cholera Orphanages . . . 670
The Meat Supply of Great Britain . . . 670

Circular to Gas Companies:—

Brynmawr Gas Act . . . 671
The Parliamentary Campaign of 1867 . . . 671
Mr. G. W. Stevenson, and the Gas Supply of Whitby . . . 672
Imperfect Gas Regulators . . . 672
On the Value of Petroleum and Shale Oil as Fuel for Steam-Boilers 672

Register of New Patents:—

Brooman, R. A.—Extensible Apparatus for the Passage of Gases and Fluids . . . 672
Starbuck and Cellars—Cement for Joints in Oil-Stills and Retorts. . 673
Macrum, J. M.—Distilling Oils and other Liquids . . . 673
Brooman, R. A.—Producing Oxygen . . . 673
Batchelor and Reddall—Retorts and Settings . . . 673
Walsh, W. J.—Cocks, Taps, and Valves . . . 673
Thomson, J. C.—Apparatus employed in the Combustion of Gas in Stoves and Burners . . . 673
White, G.—Gas-Burners . . . 673
Newton, H. E.—Water-Closets and Commode-Pans . . . 673
Bünger, W.—Gas-Burners . . . 673
Broadfoot, J.—Water-Closets . . . 673
Applications for Letters Patent . . . 673
Grants of Provisional Protection . . . 674
Notices to Proceed . . . 674
Patents which have become Void . . . 674

Miscellaneous News:—

Meeting of the Western Gas Company . . . 674
Meeting of the Wolverhampton Gas Company . . . 675
Report by Dr. Letheby on the Quality of the Water from the Pumps and Surface Wells of the City of London . . . 675
On the Future Water Supply of London, by Messrs. Hemans and Hassard . . . 676
Dr. Hillier's Report on the Gas supplied by the Imperial Gas Company to the Vestry of St. Pancras during the Months of July and August 680
A Gratuitous Supply of Gaslight . . . 680
Professor Frankland's Analysis of the Metropolitan Waters, in July . 680
Dr. Whitmore's Report on the Quality of the Gas supplied in St. Marylebone, in July, 1866 . . . 680
Dr. Whitmore's Report on the Quality of the Water supplied in St. Marylebone, in July, 1866 . . . 680
Gas Explosion in the Westminster Road . . . 681
A Gutter on Fire . . . 681
Dublin . . . 681

Share List of Metropolitan Gas Companies . . . 681
Price Current . . . 681

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, September 18, and the subsequent numbers on each successive alternate Tuesday.

This JOURNAL has been duly registered at the General Post Office for transmission abroad.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 4, 1866.

Notes upon Passing Events.

THE water question continues to be the subject of discussion. Schemes for spending millions in the course of years will not be decided on in a hurry. In the meantime each housekeeper wants to know what to do at once to be safe. As we have before stated, it is not the water as delivered by the company that we have to fear—it is the water as it becomes after mixing with the deposits of cisterns. Dr. Letheby, in his report on the composition and quality of metropolitan waters during the month of July, after giving his usual tabular statement, remarks that in that month, "in every case there is less than the average "proportion of saline and organic matter; and the reduction "of the latter, which is the important constituent of drinking "water, is most marked in the waters derived from other "sources than the river Thames. These reductions in the "quantity of organic matter have been mainly due to the care "with which the processes of filtration are conducted; and if "the analytical results are compared with those of a few years "ago, the improvement is still more remarkable." Dr. Letheby goes on to point out that, if it were practicable, it would be unsatisfactory to rely for complete purification on the filtration of the water companies, "seeing how many causes of pollution "exist between the filter-beds of companies and the con-"sumer," and seeing, also, that not one-fifth of the water supply is used for drinking purposes; the great bulk is employed for flushing water-closets, watering streets, and manufacturing purposes. "It would, therefore, be a waste of funds "to attempt to purify in bulk water which for drinking purposes "can be so much more easily filtered and treated at the point of "consumption. The daily supply of London is at the rate of "30 gallons per head; with a well-regulated constant supply it "would not exceed 20 gallons per head, and filthy butts and "cisterns could be abolished." For the present case Dr. Letheby recommends that water should be filtered in the cistern, or from the cistern through animal charcoal, and boiled. The best plan is to obtain from the London Water Purifying Company one of Danchell's patent cistern filters, which being fixed within the cistern, are self-acting, and neither subject to the tampering nor requiring the care of a servant. They are charged with animal charcoal, through which the water is caused to pass; when, being drawn by ascension through a syphon, it will continue to act as long as any water remains in the cistern. "It will yield water pure, limpid, and free from colour and "taste. It arrests the impurities in mechanical suspension, "and deprives water of organic contamination and metallic "oxides in solution."

The discussion on recruiting and arming our army would be incomplete without noticing the education our raw recruits receive. We do not mean the mere reading and writing. We should like to know that soldiers are taught to help themselves, and prepared for a time when rations ready cooked cannot be served out to them. In every part of the uncivilized world Englishmen have proved that they are first-rate colonists—that under the most difficult circumstances they can find food, shelter, and make themselves comfortable; that is to say, all Englishmen except English soldiers, who are taught to be helpless. We remember hearing of a small party of English soldiers quartered on an island in the Pacific, who were sick to death of salt meat and biscuits, until a party of sailors were sent to buoy the harbour. Within twenty-four hours they had found, climbed, and cut down the fruit of cabbage palms, commenced a garden for fresh vegetables, and established an elaborate system of traps for birds and game. M. Charles Fay, who has been writing in a French review his notes on the Crimean campaign, where he served under Marshal Bosquet, says, about the landing at Old Fort: "There were no villages, "and the English soldiers were obliged to sleep on the bare "ground until their camp-tents arrived at Balaclava. Our "men, with the little *tente-abri* put up their canvas houses in "a few minutes, and were thus protected from the cold nights "of September. As to food, the English soldier had a pound "and a half of meat a day, ours had only half a pound; but "they formed messes, and by this association lived well, while "the English soldier, cooking for himself, was half starved. "Lord Raglan, noticing this to General Bosquet one day, the "latter answered, 'Give me a pound and a half of meat to be "divided between an English and a French soldier, the French "soldier shall cook it, both shall be well fed, and you will save "half a ration.'" "We have often seen," he continues, "an "English soldier, returning after twenty-four hours in the "trenches, fainting with hunger, not take time to change his "wet clothes, obliged to look for wood to light a fire and broil "his ration. Our men had left their cook at the bivouac. They "found good soup ready for them on their return. In the "same way on the march our soldiers divide their feeding "duties; in turn they carry the bag of rations, the iron pot, "the pitcher, and the bread. They take care to pick up "faggots on the way if not sure of a supply at the bivouac. "As soon as they halt the cook digs a hole to make his hearth,

"and while he lights his fire one goes with the pitcher "to fetch water, another goes to receive the rations for the "party, a third and fourth put up the tents, and presently they "sit round the pot and take some good soup. Finally, coffee, "the most precious drink for a soldier—rather weak, but plen- "tiful—completes the feast, and contributes to the health and "good humour of the brave men." M. Fay does full justice to the courage and "solidity under fire" of the British soldier, but complains of their slow marching and needlessly formal precision of movement. No wonder—up to the day of Alma the favourite regiments had been the toys of royal and noble personages who knew nothing of real war. We have learned something since, but have still much to learn.

The British Association at Nottingham have been discussing, amongst other subjects, the origin of man and animals. One speaker put the question very plainly. He said there was the religious theory, under which man was created intelligent. The other was the theory of development from a fish, say, to a seal or a whale, to a bear, or to a monkey, and from a monkey to man. We do not intend to enter into this abstruse question further than that we find it easier to imagine the miracle of man's creation than to imagine the education of the first man-baby born of a monkey. But we venture to assert that there is not the slightest practical application to be derived in agriculture from the Darwinian theory, as far as quadrupeds are concerned; and the experiments with domestic poultry are not encouraging. Dr. Darwin made his experiments with pigeons, and Mr. Tegetmeir, who is an authority on such subjects, has given very strong evidence in favour of the rock dove (not the wood pigeon, which no one has succeeded in domesticating) being the original of all our fancy pigeons. But there success stops, so far as the most persevering attempts to tame wild ducks have had any success. No one in the last seventy years has been able to produce a new cross-breed of sheep, of horses, or of cattle. Great things have been done by selection—done with a care and perseverance which must have been miraculous in any savage tribes, and of which we have no trace in the early historic ages. The late Lord Western spent nearly a lifetime in trying to put merino wool on a Southdown carcase, and failed completely. The French Government have been for more than half a century trying to create the Dishley merino and the Anglo-Norman horse, and are as far away as ever. The question has been the subject of a most elaborate essay in the *Revue Correspondent*, by M. André Sanson. He shows that, in the cases where the wolf has been crossed with the dog, and the goat with the sheep, where the produce is prolific (it is usually infertile), in two or three generations there is a return to one or other of the original stock. There is a tendency to become entirely wolf and entirely goat. In Chili, where the goat cross is practised, at the third generation the animal called *chabin* becomes again a goat, and must be recrossed with the sheep. A few years ago a story was circulated in the French journals, and even received currency in our Royal Agricultural Society's "Transactions," that a breed had been produced and perpetuated between a rabbit and a hare, called "*leporides*." Rabbit-hares are advertised every week in an agricultural and sporting newspaper. M. Sanson went into Angoulême, the province of France where this extraordinary breed was said to be established, and tried to obtain an interview with M. Roux, the self-asserted breeder. M. Roux made an appointment, and did not keep it. He wrote again and again to M. Roux, who was president of the Agricultural Society of Angoulême, and at length forced an interview, when M. Roux was obliged to admit that he had never bred a rabbit-hare, and pretended that they had been left him by his mother! Finally, M. Lavergne, the eminent agricultural author, obtained one of M. Roux's rabbit-hares; it was dissected before a committee of the Imperial and Central Agricultural Society of France, and unanimously pronounced to be a large rabbit, and nothing else. It was then cooked, eaten, and tasted like the common domestic rabbit. "All investigation leads to the con- "clusion not only that species are fixed, but also races, "whatever pains may be taken to transform them." M. Sanson proceeds to take the instance of what is called the Anglo-Norman breed of horses. It has been the habit of a great number of French writers to assert, as they believed, that between the active compact cart-horse of Normandy and the English thoroughbred horse a new breed, combining the qualities of both—more bone and substance than the sire, more blood and activity than the dam—had been created, which could reproduce itself without having recourse to either sire or dam of the two parent stocks. But M. Sanson shows what we well know in England, that you can never depend on the produce of a cross-bred sire. He says you will see in a regiment mounted on Anglo-Norman horses no uniformity of character. One horse will have a thoroughbred head and neck and a Norman croup and tail; another will have the Norman head attached to a thoroughbred carcase of the worst character; and the breed of horses can only be made useful by constant returns to thoroughbred sires. So, too, French agricultural journals have pictures and long accounts of Dishley merinoes. But this breed, professing to unite Leicester flesh with merino wool, cannot live alone; it is constantly deteriorating, and the breeders have to return to Leicester rams to retain the advantage of the first cross. You will be told that the Dishley merino has been perpetuated for thirty years, and so it has by breeders whose names appear as regular purchasers of Leicester rams. If the cross-breds are bred amongst themselves, they soon turn on either side. In one year, of three lambs you will find one lamb a Leicester; another a merino, horns and all; a third a little of both—the head of one, the hind-quarters of the other, and the wool poor stuff. The breeds of cattle show the same results still more clearly. If we cannot, with the utmost pains, create a breed uniting merino wool with Southdown mutton, how are we to believe that from one wild sheep, with a coat not of wool but of deer's hair, all modern breeds grew, with such care as nomadic tribes could bestow? A few years ago it was thought possible to improve our live stock by crossing; it is now certain that by selection only can we improve the tribes of each species. Those who laid Cotswolds on Leicesters secretly soon found that, like drunkards, they must go back again and again to the source of size and long wool. For experiments we need not go further than the poultry-yard. Crosses between the Dorking and Cochin make famous chickens in the first generation; breed from these crosses, and in two generations they are worthless. In the second you have lost all the advantages of the first cross. You can diminish, but you cannot enlarge breeds; you may reduce game fowls to the size of bantams, but it would be just as easy to grow a duck into a goose as to grow a bantam into a Bramah Pootra. Judicious crossing to produce meat and early maturity is one of the most important arts of the farmer; but without breeders of pure stock in cattle, sheep, and pigs, Great Britain and all the Continent would soon find their meat-producing powers seriously diminished.

The value of Orphanages has been lately discussed in reference to the orphans made by the cholera. No arrangements, however costly, can replace a good mother, especially to girls. For the labouring classes two kinds of education are needful—first, the education of useful work, and, next, the education of a wholesome school. The little girl, at an age when the children of the easy classes are in the nursery, learns to nurse the baby, to dress her young brothers and sisters, to wash, to go on errands and to market, to cook—to be useful, in fact—and this is the most important education of all. Next, if fortunate, she goes to school, and learns that which enables her to teach herself by the experience of others. A cook may be very clever who can neither write nor read; but to be able to take down a good receipt, and study first principles in a cookery-book, will help the best cook amazingly. The same with boys. Those who have to work for their bread should begin early, and then bending the back and using the other muscles is not a hardship. Add to the education of work the education of the head and heart, and you have the chance of a perfect workman. Next to a parent's home, the best place for a labouring child made orphan is a home with honest moral people of its own class, who work and feed and are clothed as it may expect to be in real life. The next place is occupied by a good industrial school in pure air, where out-door work is carried on, and children are prepared for the real world. Unfortunately, in the majority of charitable establishments the education is too high or too low. Even where well taught in a literary point of view, the children are made as helpless as the British soldier. Full of useless learning, they scarcely know beef from mutton. For these reasons we are glad to see a movement toward placing orphan children in the families of decent labourers. But careful inspection will be required: the race of Brownriggs is not entirely extinct.

A paper read by Mr. Thorold Rogers in the section of Economic Science and Statistics, in which he refers to the meat

supply of England and Scotland, shows in a remarkable manner how much a learned man may be led astray by statistics to which he has not the "key of practice." Mr. Rogers takes up the statistical return of cattle, sheep, and pigs, made up to the 5th of March, 1866, and, after assuming, as he has a right to do, that the return is correct—for if, as we know, farmers from ignorant prejudice refuse to return the full number of their stock they have only themselves to blame if their importance is undervalued—on this return he makes the following calculations:—

In round numbers the population of Great Britain is about 24,000,000. In one particular only, that of sheep, is Great Britain on a general level with other countries. There is nearly a sheep to every head of population. But of horned cattle there is only one to about every five; of pigs only one to every nine. Were the amount of horned cattle in France proportionate only to that of Great Britain, France would have a little more than 6,000,000; in fact, it has rather more than 14,000,000. The same may be said of Austria. In many of the German States the proportion is higher still. In Denmark the cattle are not very much less numerous than the population. In the United States there is rather more than one head to every two of population. With pigs, as I have stated, Great Britain is very scantily provided. In France and Prussia pigs are one to seven; in Austria one to four and a half. Taking the whole of Europe, the proportion is one to six. In the United States there are more pigs than population. Had the returns supplied us with information as to poultry, the deficiency would have been still more striking. In the year 1865 this country imported more than 400,000,000 of eggs, if the hundreds of eggs be taken, as it has been from the earliest time, at 120. I need hardly inform my hearers of the fundamental canon of prices—that when the supply of any necessary of life falls short of the demand, the price rises in a proportion which I may, perhaps, venture on calling geometrical; that is, the quantity available for sale is worth increasingly more, according to the deficiency, than the normal or natural supply would be. The statistics of the cattle returns supply the key towards interpreting the high price of meat, and we may be sure that the price of meat would be higher than it actually is were it not for those improvements in stock-keeping by which cattle become more available for consumption at earlier dates—improvements which are yearly developed. This deficiency is not greatly supplemented by importation. Small as the stock of cattle is, the annual importations do not amount to more than one-twentieth of the ordinary stock, while that of sheep is, as a rule, but one-fiftieth. During the present year even these quantities must have undergone a serious diminution. Nor is the import of meat large. The most important item is that of bacon. But even here the largest estimate will not give more than the equivalent of 300,000 pigs. The beef seems to be about equal to the supply of 50,000 oxen. It is matter of regret that no facts have been collected by which we might compare the present and past supply of live stock in Great Britain. It is, of course, always dangerous to trust to impressions or to memory, but I cannot but be convinced that there has been a general and considerable diminution in the amount of live stock in Great Britain for some years past. It is now comparatively seldom that agricultural labourers are able to keep pigs; it is still more rare that they breed poultry. The enormous importation of eggs suggests that the fowls kept in Great Britain are comparatively scanty. But it is probable that the maintenance of insect-eating birds is an important provision in agricultural economy, and that when we find fault with the destruction of small birds, we forget that our practice is dispensing with a still more important means for checking the ravages of insects, as well as for supplying that great deficiency in live stock which seems to characterize our domestic economy. It is, possible, too, that the abandonment of much pasture in the northern part of the island to deer forests and grouse moors has considerably lessened stocks of lean cattle and mountain sheep.

The diminution Mr. Rogers suspects is simply impossible. A comparison of numbers of stock with population can answer no useful purpose. The question is, do our graziers produce an increasing quantity of meat? We have not the least doubt they do, and have done for more than twenty years, and for the following reasons:—The sheep of Continental Europe becomes a butcher's animal at two, three, and four years old—seldom under three years old; the English sheep is always fit to kill at from fourteen months to two years old; three years old sheep are not to be had in England in any number; the meat of an English sheep weighs more than double as much as that of a French or German sheep, with certain limited exceptions. Take neat cattle. There are 14 million horned cattle in France, but what are they, except those of a limited area in the Normandy district? Working oxen, and cows which through a great part of France also work in harness until they are ten or twelve—in fact, until they are worked out. When dead, to assert a French beast produces half as much roasting and boiling meat as an English beast, would be lively exaggeration. Fat meat is universal in this country; in France a fat joint is the luxury of a few Parisians. In Paris, in the fashionable quarters of the city, you see some very fine meat, but nowhere else. English beef, on the contrary, as a rule, is the produce of early matured beasts raised for making beef, and weighing four times as much in profitable meat as the harness ox or working cow, which yield a disproportionate share of hide, horns, bones, and other offal. It is only in the beet-root manufactories of France and Germany that you can see anything that approaches our yard-fed animals, the result of the wide spread of turnip cultivation. Again, in all the flat counties of England and Scotland, the ordinary beast partakes largely of the short-horn cross. This breed has, in a manner, superseded all others. The short-horn, cross or pure, is mature at two years old; the majority of Herefords and Devons are brought to market at under three years old, and are nearly all beef. If there is any fact in British agriculture which is quite indisputable, it is the increase of root cultivation; and as roots are only grown to feed meat, there must have been a proportionate increase of meat. Working oxen have been greatly disused, for two reasons. They are too slow for modern farm work, and, with certain exceptions, they can be more profitably fattened than worked. A comparison of the kind made by Mr. Rogers to be useful should compare the number of live stock per acre and the quality of the land. It would then appear that our land in England is more heavily stocked than any equal area in Europe; while in Scotland the improvement in the pastures of the mountains, in the weight of sheep by breeding and selection, and in the weight of polled cattle by crosses, has enormously increased the supply and the individual weights. As to pigs, they are an animal which is fed largely where waste lands and forests are open to graze them without cost. Our pigs are pretty nearly all in sties; they are double and treble the weight of the foreign pig at the same age. If we have only one pig to nine persons, he will be fit to kill at six months—at nine months, at most—while the foreign pig is still little but bristle and skin at twelve months old. There is no doubt that our pigs produce annually four times as much pork as the same number of animals in Prussia. As to poultry, climate limits the number. We can never compete with countries where mild winters, early springs, and prolific insect-life enable hens to raise large broods without trouble and with little expense or loss from chilly nights and rainy days. The high price of meat is due to increased consumption by the labouring classes. One point Mr. Rogers clearly proved—the value of agricultural statistics.

Circular to Gas Companies.

In the abstracts of the gas Acts of 1866, inserted in our last, the Brynmawr Gas Act was omitted, and the Bill was erroneously classed among those that were rejected or withdrawn. The Act incorporates a new company for supplying with gas the parish of Llanelly and certain parts of other parishes in the counties of Brecon and Monmouth, with a capital of £10,000, in £10 shares, and with power to borrow £2500. The illuminating power of the gas is to be 14 candles, the maximum price 5s. per 1000 feet, and the gas may be tested without notice. Clauses were introduced into the Act by the committee, for the protection of the works of the railway company, and prohibiting the gas company from supplying gas in districts now supplied from the three separate works of private individuals, without their consent, or without previous purchase. The standard of illuminating power was also raised by the committee from 12 to 14 candles, and a required notice of six hours before testing was struck out of the Bill.

Notes of preparation for the parliamentary campaign of next session have been already sounded in some quarters. It is understood that materials are being collected by the Home Office for a Bill for the amendment of the Metropolis Gas Act of 1860; and the metropolitan gas companies who failed last session to obtain the powers they required, are reconnoitring the suburbs of London on the north, east, and west, in search of sites suitable for the erection of new works, to which no objections can be raised by popularity-hunting members of Parliament. It remains to be seen whether the provincial gas companies who are without statutory powers for breaking up the surface of the roads to lay their mains and pipes, will take alarm at the success of the new companies at Neath and Brynmawr, in obtaining parliamentary powers in spite of the opposition of the proprietors of the established works, and will endeavour to protect themselves; or whether they will continue senselessly inactive until competition rouses them from their lethargy, when it may be too late to act efficiently. Our share list contains the names of scores of gas companies, of sufficient importance to warrant their incurring the expense of obtaining statutory powers, but who have hitherto neglected to do so. In such towns as Aberdeen, Chelmsford, Chichester, Colne, Dorchester, Durham, Lewes, Maryport, Monmouth, Peterborough, Poole, Richmond, Rugby, St. Albans, Sheerness, Todmorden, Whitehaven, Windsor, Wisbeach, and Worthing,

the public have a right to expect that the gas companies should be placed under the regulations of the Gas-Works Clauses Act. Unless that be done they will not long remain satisfied, and the gas companies will be constantly exposed to the attacks of speculators, who, without much difficulty, may excite vexatious agitation that might prove much more costly than the proceedings for obtaining Acts of Parliament. Those companies also who procured their Acts 30 or 40 years ago, such as the Isle of Thanet and the Warwick Companies, and have not since had recourse to Parliament, would do well to take warning from the experience of the Rochester and Chatham Company, and avoid the profitless expenditure of a larger sum in defending the ground they occupy, than it would have cost to place themselves in an unassailable position by adopting the Gas-Works Clauses Act. The course of modern legislation regarding the supply of gas may, perhaps, deter some old companies from subjecting themselves to its provisions; and they may object, except on compulsion, to have the standard of illuminating power raised to 14 candles, the maximum price reduced, the dividends on new capital limited to 7 per cent., and to have the quality of the gas tested at any moment. But they will find it much better to meet these difficulties of their own accord, than to have to contend in committee with an active opposition roused by their supineness, for they would then be obliged to submit to much harder conditions than might otherwise be imposed.

When a conspicuous agitator for cheap gas becomes an advocate for remunerative prices, the change deserves notice; and that Mr. G. W. Stevenson has undergone such a metamorphosis is indicated in a report recently presented by him to the lighting authority of Whitby. The town of Whitby is supplied with gas from works the property of Mr. Atkinson, of Hull, and the commissioners being about to renew their contract with him for lighting the town, applied to Mr. Stevenson for his advice. An abstract only of his report is given in the local papers, but it affords sufficient information to warrant us in complimenting Mr. Stevenson on his change of opinions. Like most new converts, however, he seems to rush into the opposite extreme; for, though Whitby is a seaport situated near the Durham coalfield, and the materials for manufacture are consequently very accessible, he considers 5s. per 1000 feet a fair price for gas to general consumers, and that the price charged to the public and to private consumers ought to be the same. The report exhibits, in these respects, a remarkable disparity from the evidence given on other occasions by Mr. Stevenson, nor do we see very clearly the force of the reasoning by which he seems to be now guided. He asserts that the small consumption of gas in proportion to the amount of population is a reason why the price should be 5s., and that the cause of that comparatively small consumption is the high price of gas; nevertheless, he reports that the public have no ground whatever for complaint, and that if under the control of the Commissioners themselves, supposing it were conducted as a private work, they could not be better nor more cheaply supplied. Mr. Stevenson, however, concludes his report by suggesting that it may be desirable that Mr. Atkinson should try the experiment whether, by reducing the price, he could not increase the consumption. We are not inclined to dispute the process of reasoning from which Mr. Stevenson has drawn his conclusions respecting the supply of gas to the town of Whitby, and we trust that in future the arguments he adduces in support of a remunerative price when the gas is supplied by a single individual will be forthcoming in cases where the gas is supplied by companies.

A handbill is in the course of extensive circulation in private houses in London, offering for sale a "patent economizing gas "regulating burner and purifier," which it is asserted "secures "to the consumers perfect and wholesome gas illumination, "and effects a saving of from 25 to 35 per cent." This is, no doubt, a tempting offer; and, as the price of the article is small, many persons may be deceived into purchasing what promises so readily to remedy all the defects and inconveniences of gas lighting, to improve the ventilation, and to effect at the same time so large a saving. The burner thus vauntingly thrust into notice is, however, nothing more than an instrument which obstructs the flow of gas by causing it to pass through a chamber filled with some permeable substance, which partially reduces the pressure at the burner, but has no effect whatever in diminishing the actual pressure of the gas in the pipes. A properly constructed governor fixed at the meter would accomplish more than all that is professed to be done by these economizers, which do not regulate the supply of gas according to variations in the pressure; and when the pressure in the mains is reduced the light becomes insufficient, without the power of increasing it.

A report presented to the House of Commons, of experiments conducted at Woolwich Dockyard, "with the view of "testing the value of petroleum and shale oil as substitutes "for coal in raising steam in marine boilers," has just been printed. The experiments were made to test Mr. Richardson's plan for burning petroleum and other mineral oils, and extended over many weeks, from the 17th of April last to the 7th of June. They were conducted under the superintendence of Mr. Richardson himself, who seems to have had every facility afforded to give his plan a fair trial. From the average of the whole experiments it appears that 13·2 lbs. of water were evaporated per pound of oil consumed, though in the last experiments much higher results were obtained. The Burslem oil and the oil from Boghead evaporated, under the most favourable circumstances, 18·38 lbs. of water per pound, and the shale oil evaporated 17·92 lbs., which is about double the quantity of water evaporated by the same weight of a mixture of two-thirds of Welsh and one-third of north country coal. In the best experiments, the average rate of evaporation per square foot of fire-grate per hour was 147 lbs. of water, which was a little more than two-thirds the rate of evaporation in the coal trial boiler, but the area of the heating surface of the oil boiler was about double that of the former for equal quantities of water evaporated. The report observes that some allowance should be made for the comparatively large surface of boiler and also for the steam used as a blast to blow the fires, but that if results so high as those of the best experiments can be obtained under ordinary circumstances, it would appear that 1 lb. of oil would evaporate about double the weight of water which 1 lb. of coal will evaporate. The practical results of these experiments are, however, decidedly against the use of petroleum as fuel for marine boilers, for, as the report observes, "taking into consideration the price "paid for these oils (from £10 to £23 per ton), it is quite "obvious that under ordinary circumstances the expense "of using oil as fuel in steam-boilers would be many times "the expense of coal." It is observed that, if a great reduction were to take place in the price of these oils, "probably "under some circumstances they might be advantageously "used instead of coal." There is left out of consideration, in this report, the much greater bulk of the oil compared with coal, and the extreme danger of fire on board the ships on which it might be used. Those considerations alone, independently of the expense and the greater amount of boiler-surface required, would be sufficient to prevent petroleum from ever becoming a substitute for coal for marine boilers. In a letter from Mr. Richardson, inserted in the *Times* of yesterday, he states that the heavy oils are best adapted for fuel, and that, by a method he has since discovered of burning the smoke, such oils may be conveniently employed for the purpose. If they were in demand, he says they might be bought at £3 or £4 per ton, and even less if manufactured in large quantities.

Register of New Patents.

15.—Richard Archibald Brooman, of 166, Fleet Street, London, for "*An improved extensible apparatus for the passage of gases and fluids, especially adapted for gaseliers.*" A communication. Provisional protection only obtained. Dated Jan. 2, 1866.

The object of this invention is to construct an apparatus for the passage of gases and fluids, especially adapted for gaseliers, which apparatus is capable of being lengthened or shortened according to the height of the room or place where it is to be used, which will remain at a determined point, and which will serve for the passage of the gas or other fluid or liquid. The apparatus does not allow of the escape of gas, and can be regulated to remain at any desired height, and consists of two cylinders connected by a caoutchouc or elastic tube, the one being free to slide outside the other. The outer cylinder is also free to turn upon the inner cylinder, and carries two buttons, which take into notches formed at different heights in two vertical parallel plates or bands fixed to the outside of the apparatus. The inner cylinder is screwed at the top to a fixed collar, threaded in the inside to receive the gas branch pipe. The central space of this collar is prolonged downwards, inside the inner cylinder by a tube, on which the upper end of a caoutchouc or elastic tube is fitted. The outer cylinder is screwed at the bottom of a moveable collar, threaded on the inside to receive the connexion of the arms of the gaselier; the central space of this collar is prolonged upwards by a tube, on which the lower end of the elastic tube is fitted. Two vertical bands or plates are fixed by screws at their upper end to the fixed collar, and at their lower to a ring which embraces the outer cylinder. These plates are

formed with notches at different heights, to receive two buttons which are adjusted in holes in the outer cylinders. When it is required to lengthen the apparatus, it is only necessary to draw down the outer cylinders, when the buttons, during this movement, will pass between the two plates as soon as the apparatus is lowered to the point required. On giving a turn to the outer cylinder, and with it to the buttons, and on causing the buttons to enter into the notches formed at that point in the vertical plates, the apparatus is securely held.

23.—GEORGE STARBUCK, of Birkenhead, Chester, oil merchant, and JOHN CARRINGTON SELLARS, of the same place, manufacturing chemist, for "*Improvements in cement for making good the joints in oil-stills and retorts and joints exposed to medium or high temperatures.*" Provisional protection only obtained. Dated Jan. 3, 1866.

The object of this invention is the manufacture and use of an improved cement for luting or making good the joints of oil-stills, flanges, and sockets of mineral oil and other stills, oil, spirit, and gas-retorts used for the distillation of liquid or solid substances, where they are exposed to a medium or high temperature. This cement or luting consists of any compound, chemical or simple, or any admixture of any mineral substance or substances, as the salt or oxide (whether artificially made or occurring as natural products) of iron, carbon, magnesia, manganese, lime, strontia, baryta, soda, potash, alumina, chromium, sand, or zinc, combined with silicate of ammonia, or silicate of soda, or silicate of potash, or any mixture of them, either in a dry or liquid state; but it is preferred to use the compound or mixture made in the form of paste (requiring the aid of heat when applied to the joint, to cause it to harden), in which state it is proposed to use it as a lute for the flanges, sockets, or other joints, as hereinbefore stated.

70.—JAMES MARIUS MACRUM, of Hill Street, Knightsbridge, Middlesex, gentleman, for "*Improvements in the apparatus and process for distilling oils and other liquids.*" A communication. Provisional protection only obtained. Dated Jan. 9, 1866.

This invention consists in exhausting air from the still, condenser, or receiving-vessel, so that the distilling process may be carried on under a partial vacuum; and in the arrangement and construction of the still and its furnace, and of the condenser and receiving-vessel, composing the apparatus.

85.—RICHARD ARCHIBALD BROOMAN, of 166, Fleet Street, London, for "*An improved method of producing oxygen.*" A communication. Patent dated Jan. 10, 1866.

Manganates and permanganates of potassa, soda, and baryta; ferates of potassa, soda, and baryta; chromates of potassa, soda, and baryta; and in general all metallic oxides or acids which will form with potassa, soda, and baryta binary combinations capable of super-oxidizing, possess the property of yielding their oxygen at a more or less elevated temperature when they are submitted to the action of a current of steam. These bodies thus deoxidized also possess the property of becoming reoxidized when they are exposed to the action of a current of air at a temperature more or less great; and the present invention consists in the direct production of oxygen by means of atmospheric gas, and is based upon the double property just cited.

91.—PERCIVAL ASHTON BATCHELOR, of 34, Upper Berkeley Street, Portman Square, London, engineer, and FREDERICK REDDALL, of 81, Bride Street, Westbourne Road, Barnsbury, accountant, for "*Improvements in the construction, arrangement, and application of retorts and settings, in combination with machinery or apparatus for the manufacture of coal or other gases.*" Provisional protection only obtained. Dated Jan. 11, 1866.

This invention consists in the employment and adaptation of one, two, or more retorts of cylindrical form, composed of steel or other suitable material calculated to bear a high degree of heat, and made to revolve or rotate at any desired speed. From the constant revolution of the retorts, the charge contained therein is continually turned over, and thoroughly and effectually exposed to the intense action of the heat from the furnace, which is permitted to circulate freely around the exterior of the retorts.

102.—WILLIAM JOHN WALSH, of Brentwood, Essex, for "*Improvements in cocks, taps, and valves.*" Patent dated Jan. 12, 1866.

These improvements have special reference to high-pressure cocks, taps, and valves. A grooved or triangular spindle is employed furnished with a knob or top, for the convenience of being pressed when it is desired to open the cock, tap, or valve. On the said spindle is fitted a brass or other metal barrel, fitted with a valve at its upper and lower ends. Between these valves is the aperture of the outflow-pipe. To the bottom of the grooved or triangular spindle above named is fitted a small valve, which is opened by pressing the knob or top of the spindle. The small valve being open, the water, steam, or other fluid flows upwards along the grooves or sides of the spindle on to the top of the upper valve situated at the top of the metal barrel, which then becomes pressed down, opening the lower valve, when the water, steam, or other fluid flows out. When the pressure on the spindle is withdrawn, the force of the water, steam, or other fluid closes the small valve at the bottom of the spindle, in consequence of which the pressure is removed from the upper surface of the top valve, when the pressure in the other direction forces the metal barrel back into its place, and so closes the cock, tap, or valve. It can be effectually applied to stop, bib, and ball cocks.

110.—JOHN CALVIN THOMSON, of 14, Burney Street, Greenwich, Kent, for "*Improvements in means or apparatus employed in the combustion of gas in gas-stoves and burners employed in heating and cooking.*" Patent dated Jan. 13, 1866.

For this purpose a chamber is employed, into the interior of which gas is admitted from a jet or jets and becomes mixed therein with atmospheric air. This mixing-chamber consists of an inner and outer tube forming an annular chamber, the top of which is covered with a ring of finely perforated metal or wire gauze, on the upper surface of which the mixture of gas and atmospheric air is burnt. The bottom of this annular mixing-chamber is closed with a plate of metal having suitable apertures therein for the purpose of admitting atmospheric air to the annular chamber to become mixed with the gas therein. This chamber is placed at the lower part of a suitably formed case or cylinder, of sheet-iron or other suitable material, in the interior of which is fixed a conical tube, the lower and larger end of which fits within and is fixed to the outer case or cylinder a short distance above the mixing-chamber. To the interior of the conical tube, and at the upper and smaller end thereof, is fixed another conical tube, the lower and smaller end of which descends a short distance below the surface of the wire gauze or perforated metal, above which the mixture of gas and atmospheric air is burnt. The atmospheric air between the two conical tubes becomes highly heated, and thereby induces a current of air over the flame and down between the inner conical tube and the mixing-chamber, and thence up the inner conical tube, whereby the flame is caused to descend and a more perfect combustion of the gas takes place. The atmospheric air is prevented rising to an objectionable degree from the lower part of the case or cylinder, by means of a diaphragm of wire gauze or perforated metal.

133.—GEORGE WHITE, of 68, Queen Street, Cheapside, London, for "*Improvements in gas-burners.*" A communication. Provisional protection only obtained. Dated Jan. 15, 1866.

The object of these improvements in gas-burners is to offer a ready means for regulating the illuminating effect of either bat's-wing, fish-tail, Argand, or other similar gas-burners, by regulating exactly the quantity of atmospheric air to be admitted to the gas-flame. For this purpose the burner is provided on the outside with a moveable jacket, socket, casing, or cap, having one or more openings through which either the gas-flame or the entire top or part of the top of the burner may be caused to protrude, provision being made for allowing the setting of the said jacket, socket, tube, casing, or cap, at any required height, and thus allow more or less air to be admitted to the flame, thereby regulating the intensity of this latter, according to the nature of the gas and the amount of pressure. By preference a male screw-thread is cut in the outside of the burner, which screw enters into a corresponding female screw-thread provided in the inside of the jacket, socket, tube, casing, or cap, or this latter may be arranged in such a manner as to allow of its gliding gently over the smooth outer surface of the burner; or, in fact, any other suitable mechanical arrangements may be resorted to, that allows of regulating at will the position of the opening or openings of the jacket, socket, tube, casing, or cap, in respect to that of the slit or slits, hole or holes, or other opening of the burner, through which the gas takes its exit.

135.—HENRY EDWARD NEWTON, of 66, Chancery Lane, London, mechanical draughtsman, for "*Improvements applicable to water-closets and commode-pans.*" A communication. Patent dated Jan. 15, 1866.

The closing of the direct orifices of the pans is looked upon as a secondary consideration, and the object intended is effected by surrounding the seat or portion occupied by the person when sitting down with a continuous hermetic joint at the upper part of its circumference, thus enclosing the pan (and the parts contiguous thereto) in the limits within which the matters whether solid or liquid can be projected. By this means, not only are the fœcal matters arrested, but also any others which might adhere to the interior of the space above mentioned. In order to do away as much as possible with any obstacle which might stop the descent of the solid matters, the sides of the pan are made vertical instead of inclined as usual. With regard to the urine, it is arrested by the front projections set in such a manner that it prevents splashing, and forces the liquid to flow down inclines into the receptacle below.

185.—WILLIAM BÜNGER, of 17, Southampton Buildings, London, C.E., for "*Improvements in gas-burners.*" A communication. Provisional protection only obtained. Dated Jan. 20, 1866.

This improved gas-burner is formed in two parts, fitting together. The lower part of the burner passes into the gas-pipe, and is by preference of similar form to an ordinary gas-burner placed in an inverted position within the supply-pipe. The gas passes through the internal orifice to the other or outer part of the burner, which is of the usual construction, but is formed with a larger orifice than the inner one. By passing through the internal orifice the pressure of the gas is reduced before it reaches the flame or point of combustion, and when a very steady flame is required, the chamber between the inner and outer orifices of the gas-burner is fitted with an intercepting layer of cotton, asbestos, metal filings, wire gauze, or other similar materials, for the gas to pass through before it reaches the point of combustion.

199.—JOHN BROADFOOT, of Glasgow, Lanark, N.B., plumber and brass-founder, for "*Improvements in water-closets.*" Provisional protection only obtained. Dated Jan. 22, 1866.

This invention relates to the construction of water-closets in a simple and efficient manner, with double discharge-valves, so as to be suitable for ships and in other situations.

APPLICATIONS FOR LETTERS PATENT.

2125.—GEORGE EDWARD MOORE, of Birmingham, in the co. of Warwick, metal dealer, for "*Improvements in apparatus for filtering and purifying water and other fluids.*" Aug. 18, 1866.

2183.—JOSIAH GEORGE JENNINGS, of Palace Wharf, Stangate, in the co. of Surrey, sanitary engineer, for "*Improvements in water-closets, urinals, and taps.*" Aug. 24, 1866.

2201.—WILLIAM PIERCE, of Over Darwen, in the co. of Lancaster, manufacturing chemist, for "*Certain improvements in the method of purifying gas, whereby its illuminating properties are improved, and in the apparatus connected therewith.*" Aug. 27, 1866.

2218.—ROBERT IRVINE, of Magdalen Bridge, near Musselborough, in the co. of Mid Lothian, N.B., for "*Improvements in treating and purifying water.*" Aug. 28, 1866.

GRANTS OF PROVISIONAL PROTECTION.

1162.—ALFRED UPWARD, of the Chartered Gas Company, 146, Goswell Road, in the co. of Middlesex, civil engineer, and the Hon. ARTHUR AUCKLAND COCHRANE, of Westminster, for "*Improvements in the manufacture of gas.*" April 25, 1866.

2023.—RALPH MEDCALF, of Bow Lane, in the City of London, engineer, and WILLIAM NICHOLLS, of Bow, in the co. of Middlesex, pattern maker, for "*Improvements in couplings or connexions, particularly adapted for coupling or connecting gas, water, and other pipes.*" Aug. 6, 1866.

2025.—JOHN HAMILTON, of Glasgow, in the co. of Lanark, N.B., merchant, for "*Improvements in artificial materials for producing gas for illuminating purposes.*" Aug. 6, 1866.

NOTICES TO PROCEED.

1084.—JOHN DICKINSON, the younger, of the city of York, plumber, for "*Improvements in cocks or taps for high pressure, hot and cold water, and for kitchen-ranges.*" April 17, 1866.

1116.—JOHN LEIGH, of the city of Manchester, in the co. of Lancaster, for "*Improvements in the purification of coal gas.*" April 20, 1866.

1163.—GEORGE EDWARD NOONE, of 50, George Street, Hastings, in the co. of Sussex, civil engineer, for "*Improvements in machinery and processes for deodorizing and treating sewage and other refuse, and manufacturing therefrom manure and other substances for chemical and other uses.*" April 25, 1866.

1470.—BALDWIN FULFORD WEATHERDON, of 77, Chancery Lane, in the co. of Middlesex, civil engineer and patent agent, for "*Improvements in gas pyrometers, which may also be employed as thermometers.*" A communication. May 26, 1866.

1330.—SAMUEL MIDDLETON, of 19, Shoemakers Row, in the City of London, shoemaker, for "*Improvements in the method and means of securing and discharging the contents of pipes and vessels.*" May 9, 1866.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1825.—EDWARD THOMAS BAINBRIDGE, "*Improvements in ventilators.*" July 21, 1863.

1921.—GEORGE STEVENS, "*Improvements in means or apparatus for effecting a regular supply of air or aeriform fluids for various purposes.*" Aug. 4, 1863.

1940.—JOHN TENWICK, "*Improvements in self-acting valves and traps for sewers.*" Aug. 6, 1863.

1975.—EDWARD MYERS and HUGH FORBES, "*An improved rotary pump.*" Aug. 11, 1863.

2087.—LOUIS EMILE CONSTANT MARTIN, "*Improvements in apparatus for heating and purifying water.*" August 22, 1863.

2098.—RICHARD ARCHIBALD BROOMAN, "*Improvements in air and gas engines.*" Aug. 24, 1863.

Miscellaneous News.

WESTERN GASLIGHT COMPANY, LIMITED.

The Ordinary General Meeting of the Shareholders of this Company was held at the Offices, No. 28, Argyll Street, Regent Street, London, on Thursday, Aug. 30—F. W. RUSSELL, Esq., M.P, in the chair.

The SECRETARY read the notice calling the meeting, the seal of the company was affixed to the register of shareholders, and the following report and accounts were taken as read:—

The directors, in submitting to the shareholders the usual statement of accounts for the year ended the 30th of June last, are happy to report the steady progress of the company's business. It will be borne in mind that the price of gas was reduced 6d. per 1000 feet from Lady-day, 1865. By this reduction the consumers had saved at Midsummer last upwards of £10,000. Owing, however, to the constantly increasing demand for gas in the company's expanding district, the gas and meter rental for the past year exhibits an increase on the previous year of £3104. In the returns for coke and other products there is an increase of £1748, and in the total income of the company an increase of £4852.

The divisible profit on the twelvemonth's working, with the addition of £277 0s. 8d. surplus from the last year's account, is £31,428 5s. 9d. After deducting the dividend paid in March last, for the first half year, at the rate of £10 per cent. per annum, and interest on the D share deposits, the balance now standing to the credit of profit and loss is £17,261 13s. 5d. A further dividend at that rate will absorb £15,000, after payment of which a surplus of £2261 13s. 5d. will be carried to the next year's account.

The directors therefore recommend the meeting to declare for the second half of the company's financial year, the following dividend, less income-tax, viz.:—

10s. per	A share	. . .	(£10 paid)
5s. ,, new	B ,,	. . .	(£ 5 ,,)
3s. ,,	C ,,	. . .	(£ 3 ,,)
1s. ,,	D ,,	. . .	(£ 1 ,,)

In order that the company may meet in the most satisfactory manner all demands for gas that can possibly be made upon it during the coming winter, the directors are having the new retort-house made ready for carbonizing to any extent that may be necessary, a set of additional purifiers erected, and larger leading mains laid in several parts of the company's district.

Messrs. William Thomas Makins (who has been elected since the last general meeting, on the resignation of his father, Mr. Charles Makins), John Swaffield Orton, and Francis William Russell, M.P., directors, and Mr. Thomas James Briggs, auditor, retire by rotation, and respectfully offer themselves for re-election.

General Balance-Sheet, for the Year ended June 30, 1866.

Dr.		*Cr.*	
To Proprietors capital, viz.:—		By Permanent investment	£328,109 6 8
20,000 A shares (£10 each)	£200,000 0 0	Sundry debtors	29,117 9 8
10,000 new B's (£5 paid)	50,000 0 0	Stock in trade	9,051 1 8
10,000 C's (£3 paid)	30,000 0 0	Cash in hand	7,353 15 1
20,000 D's (£1 paid)	20,000 0 0		
	£300,000 0 0		
New B share loan account	£ 6,960 0 0		
Bonds and debentures	38,500 0 0		
	45,460 0 0		
Sundry creditors	10,523 7 0		
Unclaimed dividends	291 17 1		
Leasehold redemption-fund	94 15 7		
Profit (balance to be appropriated)	17,261 13 5		
	£373,631 13 1		£373,631 13 1

Capital Statement, June 30, 1866.

Dr.			*Cr.*		
To Expenditure to June 30, 1865, as per former statements		£341,873 15 7	By Share capital, &c., to June 30, 1865, as per former statements		£299,068 2 7
Expended from July 1, 1865, to June 30, 1866, viz.:—			Call on class C shares, due July 1, 1865	£10,000 0 0	
Works extension on freehold	£ 574 19 6		Less received before that day	4,025 0 0	
Ditto on leasehold	8,868 10 1			5,975 0 0	
Main-pipes, £1395 3s. 3d.; laying, £727 12s. 11d.	2,122 16 2		Deposit on 20,000 class D shares	20,000 0 0	
Service-pipes, £407 11s. 5d.; laying, £370 1s. 4d.	777 12 9				£325,043 2 7
Reinstating roads	342 2 7		Loans at this date		45,460 0 0
Meters, £1510 10s. 5d.; fixing, £131 5s. 5d.	1,641 15 10				
Lamp-posts and lamps account	83 16 11				
	14,411 13 10				
Balance	14,217 13 2				
	£370,503 2 7				£370,503 2 7

Revenue Statement, June 30, 1866.

Dr.		*Cr.*		
To Coal	£46,162 8 6	By Gas	£94,692 9 10	
Supervision and labour	10,024 15 5	Meter-rental	2,637 13 7	
Water, oil, and sundries	1,457 9 10			£97,330 3 5
Works renewal	4,270 6 2	Coke	£5,120 9 10	
Restoring pipes and meters	1,920 15 6	Breeze	2,836 7 9	
Lamp lighting	1,530 0 9	Tar	3,364 5 8	
Repairing lamps	379 19 3			11,321 3 3
Direction and audit	1,370 0 0			
Salaries	3,503 15 4			
Collector's commission	1,142 16 10			
Rents, rates, and taxes	1,286 5 5			
Stationery and printing	365 9 1			
Incidental expenses	1,348 11 4			
Bad debts	508 13 2			
Leasehold redemption-fund	25 0 0			
Profit of year to June 30, 1866, carried to profit and loss account	33,360 0 1			
	£108,651 6 8			£108,651 6 8

Profit and Loss Statement, June 30, 1866.

Dr.		*Cr.*		
To Interest on loans	£ 2,208 14 6	By Balance from June 30, 1865	£18,839 10 8	
First half year's dividend, declared March last, and interest on D share deposits	14,166 13 4	Less dividend declared August, 1865	18,562 10 0	
Balance to be appropriated	17,261 13 5			£ 277 0 8
		Revenue account (profit of year, to June 30, 1866)		33,360 0 1
	£33,637 0 9			£33,637 0 9

The CHAIRMAN: Gentlemen, in addressing you at the close of our year, I have but little to add to that which the report you have now in your hands has already explained to you. It is very satisfactory to find that our expectations have been fully realized, and that although we have made a very considerable reduction to the advantage of the public in the price of our gas, we still find that such is the elasticity of the district we occupy, that it has more than replenished itself. We believe that owing to our position and the circumstances under which this company was formed, we may look forward to a continuance of our prosperous state. I regret very much that however satisfactory that is to us it does not appear satisfactory to others. There has been an active desire on the part of consumers in London, I think most unreasonably, to wish to upset a state of affairs which I am quite satisfied conduces as much to their benefit as to yours. I believe the public derive much greater advantage from the proper conduct of the companies—and I am sure they are fairly and honestly conducted generally—than the shareholders themselves. Those consumers who complain of the price, being in trade, if they were compelled to accept the same profits as those which you are obliged to be satisfied with, would raise a general outcry, and they would say it was great tyranny and despotism on the part of the Legislature to impose upon them a restriction of profits which they had earned by enterprise and a knowledge of their business. This feeling at last got expression from a body which I think ought to be the last to move, namely, the corporation of London, which should be eminently a body to protect vested interests. But instead of that, urged on as their friends state by the pressure from below, they give expression to that feeling, and they brought into the House a bill which would have attacked those privileges which were conferred on the companies under what I consider to be our charter of 1860. That case was proceeded with before a large committee of the House of Commons, selected from members on both sides, and others appointed by the House itself. They sat for several days, and our case was most carefully conducted by the most eminent agents, Messrs. Baxter and Co. Previously to that a committee was formed of the chairmen of the companies and a few of the secretaries, amongst whom my friend on my left (Mr. Barber) acted for us with his usual ability. Our case was conducted most carefully, but I must say a most extraordinary and a most indefensible decision was come to by the committee. That committee gave us to understand they were so satisfied with us that they did not wish to hear any evidence adduced by the gas companies, nor even speeches from them. In point of fact, they led us to believe that no case was made out against us; they stopped our mouths, and we left the matter entirely with them. But what was the result? We found that in spite of that they brought in a report adverse to us. Still that report became a dead letter, and we find affairs precisely as they were. Gentlemen, we shall be prepared to defend your rights on all occasions whenever we find them attacked, and we hope with the same success as attended us last year. I hope that the public good sense of the country, and also feeling of justice, will prevent any perseverance in that course of annoyance. It has a serious effect upon the value of your property, for nothing can depreciate your property more than these constant attacks which are made upon us. I do hope and trust that we shall soon see the end of them—that our property will be allowed to go on improving in value as it ought to do—and as long as we persevere in our present course, I have no doubt it will. I have now to move that the directors report, together with the accounts, be received and adopted.

Mr. LIGHTLY SIMPSON (deputy-chairman): I beg to second the motion.

Mr. RHODES: I am very glad to receive such a report and such accounts, especially as it shows the public the benefit they are deriving, in the shape of £10,000, from a reduction in the price of our gas. But I should like to have some explanation of the leasehold redemption-fund.

The CHAIRMAN: A portion of the land we hold is freehold, and another portion is leasehold. We think it is right and proper that a certain sum should be set aside each year to restore the value of that property upon the termination of the lease.

Mr. RHODES: How many years has the leasehold to run?

The CHAIRMAN: About 95.

Mr. RHODES: Is there any likelihood of a call being made during the next six months?

The CHAIRMAN: It is impossible to tell. I am afraid I cannot hastily announce a piece of such good news to you as making a call, for happily in this company our shares do not go down from the making of a call. But as soon as we require the money we shall not hesitate to tell you.

Mr. RHODES: I suppose the company pay for the repair of public lamps.

The CHAIRMAN: Yes; that is part of the enactment.

Mr. RHODES: Is the amount stated for bad debts for six or twelve months?

The CHAIRMAN: Twelve.

Mr. RHODES: Do you charge for meters to the consumers?

The CHAIRMAN: Yes.

The resolution for the adoption of the report and accounts was then carried unanimously.

Upon the recommendation of the board of directors, it was unanimously resolved to pay a dividend of 10s. per A share, 5s. per new B share, 3s. per C share, and 1s. per D share.

A PROPRIETOR: Hitherto you have been in a position to pay interest and arrears of dividends. That now ceases, and consequently the demands upon the profits of the company must be much smaller. I do not know whether you could pay the dividend free of income-tax.

The CHAIRMAN: That question is not now brought forward for the first time. We have taken the very best legal opinion upon the matter, and we find we are restricted by the Act to the payment of the dividend, and that the income-tax must be paid by the shareholders themselves.

The retiring directors and auditor were then re-elected.

Votes of thanks to the chairman, the directors, the secretary, the engineer, and the other officers of the company, were also passed, and a suitable acknowledgment brought the proceedings to a close.

WOLVERHAMPON GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Wolverhampton Gas Company was held on Tuesday, Sept. 25, in the Board Room of the Company, at their Offices, in Queen Street—Mr. JOSEPH COOPER (chairman of the directors), presiding.

The SECRETARY read the following report:—

In presenting the 29th half-yearly report and balance-sheet, it is the pleasing duty of your directors to lay before you what they trust will be considered a very satisfactory statement. The total income for the past half year, made up to the 30th of June, and duly certified by your auditor, amounts to £14,334 3s. 3d., and the expenditure to £9758 19s. 10d., leaving a balance of £4575, 3s. 5d., which enables your directors to recommend the declaration of the usual dividend of 5 per cent. for the half year, free of income-tax, payable forthwith, if approved by the proprietors.

Your directors have had under their consideration the necessity of increasing the storeage of gas at their Stafford Road station; and, after a careful investigation, they decided to proceed at once with the erection of an additional holder, to meet any probable increase in the manufacture. The excavation of the tank is already finished in a very satisfactory manner, and the brickwork is also far advanced, and the erection of the holder itself will be commenced in a few days; so that your directors have every reason to believe the whole will be ready for active operation in the course of the ensuing winter. The company will then possess a work complete in itself, and capable of supplying any increased demand for gas for several years.

The removal of the offices to more central premises in Queen Street, alluded to at the last general meeting, has been carried into effect, and your directors trust the accommodation now afforded will be duly appreciated by the shareholders and the general public.

In conclusion, your directors have only to repeat their thanks for the confidence reposed in them by the shareholders, and to assure them of their continual attention to the important interests committed to their care.

The CHAIRMAN said that he was not aware that there was any circumstance that had occurred during the past half year calling for remark that day, but if there was any gentleman who wished for information he should be glad to give it. He begged to propose the adoption, &c., of the report.

The DEPUTY-CHAIRMAN seconded the motion, and it was carried.

The dividend recommended was then declared.

In reply to Mr. Simkiss, it was stated that to pay the dividend recommended the sum of £4300 was required.

Mr. HILL congratulated the board on the small amount of bad debts which was shown in the statement of accounts. Either the accounts were remarkably well collected, or else the company was very fortunate, for the bad debts amounted to only £45.

The CHAIRMAN said that they tried to keep the accounts closely collected; and the small amount of bad debts was certainly very satisfactory.

The DEPUTY-CHAIRMAN said that the circumstance spoke well for the financial state of Wolverhampton, for their accounts embraced the whole of the town, and all classes of persons.

On the proposition of Mr. LANGMAN, thanks were voted to the directors.

The CHAIRMAN, in responding, said that it was always gratifying to the directors to have the confidence of the shareholders, and he could only hope that the future labours of the board would result in consequences, if possible, more satisfactory to the shareholders than heretofore.

The respective dividends due to the shareholders present were handed to them, and the proceedings terminated.

REPORT ON THE QUALITY OF THE WATER FROM THE PUMPS AND SURFACE WELLS OF THE CITY OF LONDON.

By Dr. LETHEBY.

To the Special Sanitary Committee of the Commissioners of Sewers of the City of London.

Gentlemen,—In consequence of the numerous applications lately made to me for information of the quality of the water supplied by the several pumps of the City, I think it necessary to report to you the average results of my numerous analyses of these waters during the last five years.

Altogether there are 35 pumps in the City from which the public are in the daily habit of drawing water for drinking purposes, and, as you will perceive from the accompanying table, the quantity of saline and organic matter in the gallon ranges from 26·63 grains to 129·73—that of the New River during the last month being but 17·16 grains, and of the East London 18·18. Only six of the City wells yield water with less than 50 grains of solid matter in the gallon, and there are but two others with less than 70 grains. Ten of them contain from 70 to 80 grains per gallon, nine have from 80 to 90 grains, two have from 90 to 100 grains, and there are five wells in the City—namely, those in Aldgate High Street, in Bishopsgate Street (by Dunning's Alley), in Leadenhall Market, in Milton Street, Cripplegate, and in St. Nicholas Olave Churchyard—the water of which contains from 100 to 130 grains of solid matter per gallon.

In most cases, too, the constituents are remarkably indicative of the source and nature of the pollution. The wells of the public meat markets, for example—as those of Newgate, Aldgate, and Leadenhall—are charged with the peculiar filth of those localities; indeed, the water furnished by the well in Leadenhall Market contains nearly 40 grains of common salt per gallon, besides a large quantity of nitre and organic matter, all of which is derived from the stinking serosity which runs from the hides exposed for sale and salted upon the public way. The wells of the City churchyards and their neighbourhood are also strongly tainted with saltpetre and ammonia, the former to the extent of from 20 to nearly 30 grains in the gallon, and doubtless it is the final product of the decay of the animal matter buried in the neighbouring graveyards. Others of the public wells show the presence of the more or less oxidized products of substances which have escaped from adjoining drains and sewers; and nearly all of them are so largely impregnated with compounds which have percolated through the foul soil of the City that they are entirely unfit for domestic use. Where the soil is well protected, and the pump is away from any especial source of pollution, as is the case with the two pumps at Guildhall, the water is but moderately tainted with impurities; but even there it is dangerous to use the water for drinking purposes, for there is no saying how soon it may become foul from a neighbouring sewer or cesspool.

I have already reported to you that, as most of these waters are bright and sparkling, and have a cool and agreeable taste, they are much sought after for drinking purposes; but the coolness of the beverage and the briskness of its appearance are dangerous fascinations, for they are both derived from organic decay. In fact, the dead and decomposing matters accumulated in the soil are partially changed by a wonderful power of oxidation, and thus converted into carbonic acid and nitre. These give to the water the agreeable qualities which are so deceptive; and although they are so frequently drunk without any apparent manifestation of injury to health, yet it cannot be that the products of such corruption can be admitted into the human body without danger of insidious mischief; and at the present time there is the still greater danger of the impurities of the soil passing unchanged into the water, and being a source of quick and certain injury. In illustration of this it is hardly necessary to remind you of the remarkable outbreak of cholera which occurred in the parish of St. James, Westminster, in the autumn of 1854, and which was traced to a favourite pump in Broad Street. It was noticed on that occasion that the disease was confined to a small area in the neighbourhood of the pump; and that, of 73 persons who died during the first few days of the visitation, 61 had been drinking the water. It was even observed among persons who were living in the same street, and occasionally in the same houses, that those only were attacked who drank the favourite water of the pump. But more remarkable still, it was ascertained that persons who lived at a distance from the parish, and who had the water sent to them because of its supposed goodness, were seized with cholera and died. A full inquiry into all the circumstances of the case proved that the well had become charged

with cesspool drainage, and had thus acquired its poisonous action. The pollution had perhaps been going on for years, and yet the water had not betrayed it, until a slight excess of organic impurity brought out its dangerous properties. As in the case of most of the City wells, its cool and sparkling qualities had gained for it such a high repute in the neighbourhood, that it was a favourite water, and was generally drunk.

Another such a case occurred at West Ham, in Surrey, in the autumn of 1857. Suddenly at that place there was a visitation of cholera in a row of 16 cottages that were apparently isolated from epidemic influences. It showed itself along one side of the street, where, in a few days, 13 persons were attacked with the disease, 7 of whom died. Dr. Elliott, the health officer for the district, suspected from his inquiries that the common pump on that side of the street had been concerned in the mischief; its water was therefore examined, and it was found to be polluted with the soakage from an adjoining sewer. At once the use of it was interdicted, and, to make the matter certain, the handle of the pump was taken away; and from that moment the further spread of the disease was arrested.

Again, I would remind you, in illustration of this subject, that in the cholera visitations of 1848-9 and 1853-4, there were two striking examples of the influence of such water in the propagation of disease. The southern districts of London, comprising nearly a fifth of the population of the metropolis, were visited most severely with cholera at both of those outbreaks, and the persons who suffered most on each occasion were those who drank the worst quality of water. The inhabitants were supplied by two rival companies, who obtained their water from the Thames at different parts of its course. In one case the water was charged with a larger amount of organic matter than in the other; and although the conditions of the population were in every respect the same, yet this had the effect of augmenting the mortality to a frightful extent. In the second visitation of the disease, the circumstances of the supply were changed: the water of the old company, which was formerly the worst, was now the best, and the severity of the disease was changed likewise; for those who partook of the still bad supply suffered as before, and their mortality was three-and-a-half times greater than their neighbours, it being at the rate of 130 in the 10,000 instead of 37; and a similar tale may be told of the cholera visitation of many other places in this country.

All these are warnings to us of the danger of using water polluted with sewage, or the drainings from cesspools; nor are the percolations from the graveyards of a city less injurious, for experience has demonstrated that these also are a prolific source of disease. Let me refer to one instance only, on the authority of Sir James Macgregor, who relates that, when the British army was in Spain, about 20,000 soldiers were buried in a rather small space of ground, and, after two or three months, the troops who drank the water from the wells of the neighbourhood were attacked with dysentery and malignant fevers. The cause of the mischief was clearly traced to the hardly recognizable impurity in the water from the shallow wells. Here, however, in the churchyards of this City, there are the remains of ten times such a buried army undergoing decay; and in the whole of the metropolis, in a space of not more than 218 acres, there were buried not long since as many as 50,000 dead in the year. In a generation of 30 years, this would give us a million and a half of decomposing bodies in the surface soil of London; and through this the water percolates, to find its way into the porous stratum which supplies the shallow wells of the metropolis. At best, the change of this corruption is but imperfect, for although the presence of ammonia and saltpetre tells us of an ultimate process of decay, yet it also indicates the more than possible danger which accompanies it.

All these considerations should force upon us the conclusion that water from the surface wells of the metropolis, contaminated as they are with the refuse of drains and the soakings from graveyards, is unfit for public use, and that no natural process of oxidation can render it safe. I advise, therefore, that none of the water furnished by the City pumps, nor by any of the pumps of London, should be used for domestic purposes.—I remain, gentlemen, your obedient servant, HY. LETHEBY.

Guildhall, Aug. 20, 1866.

Composition of the Waters of the Pumps and Surface Wells of the City of London.

Names of Pumps.	Carbonate of Lime and Magnesia.	Sulphate of Lime and Magnesia.	Alkaline Chloride.	Alkaline Nitrate.	Silica and Alumina.	Organic and other Volatile Matter.	Total per Gallon.
	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.
Aldgate	23·43	15·63	13·17	19·37	0·96	4·87	77·43
Aldgate High Street	25·30	24·30	20·70	24·20	1·12	8·13	103·75
Bartholomew Lane	21·70	16·17	15·47	16·50	0·97	4·56	75·37
Basinghall Street	21·17	25·20	12·73	13·60	0·97	6·30	79·97
Bell Yard, Gracechurch Street	19·29	12·80	19·11	19·58	1·00	8·22	80·00
Bishopsgate Church	22·60	21·20	18·20	17·33	1·10	6·23	86·66
Bishpsgt. St., by Dunning's Alley	32·23	33·54	22·43	16·06	1·50	9·07	114·83
Bow Churchyard	25·80	19·13	18·47	12·87	1·00	5·43	82·70
Bowling Square	18·67	26·20	11·17	9·13	1·00	4·93	71·10
Bride Lane	14·53	23·07	25·53	24·27	0·93	6·87	95·20
Cannon Street West	14·80	13·73	10·87	25·53	1·00	5·10	71·03
Chequer Yard, Dowgate Hill	20·53	16·43	11·87	16·57	1·03	7·03	73·46
Cock & Hoop Yd., Houndsditch	19·93	17·33	13·03	21·90	1·00	5·60	77·79
Cornhill	22·13	18·20	10·70	16·23	1·20	5·37	73·83
Cree Church Lane	21·07	9·43	6·70	7·17	0·87	2·56	47·80
Fenchurch Street	21·77	20·23	14·50	21·33	0·87	7·23	85·93
Guildhall	12·90	8·65	4·30	3·05	0·95	2·90	32·75
Guildhall Buildings	13·37	4·40	3·40	2·76	0·60	2·10	26·63
Gutter Lane	16·57	15·53	7·47	10·53	0·97	5·33	56·40
Great St. Helen's	15·47	10·83	6·30	12·27	0·76	3·50	49·33
Half Moon Passage	16·40	13·00	17·23	15·00	0·87	3·50	66·00
Herald's College Yard	14·57	21·90	15·87	30·50	0·93	5·86	89·63
Honey Lane Market	16·10	10·50	9·23	6·63	1·10	3·27	46·83
Idol Lane	15·70	19·50	15·73	22·63	1·30	5·44	80·30
Ironmonger Lane	19·27	30·60	13·57	15·07	1·26	6·90	86·67
Leadenhall Market	16·63	23·97	38·60	29·13	1·07	5·53	114·93
Little Britain	25·27	29·93	13·83	6·42	1·43	8·27	85·17
Minories	21·93	21·70	15·46	29·00	1·23	6·63	95·97
Milton Street, Cripplegate	33·63	37·84	22·93	23·50	1·33	8·34	127·57
Mitre Square	17·23	10·33	7·27	6·03	0·97	4·37	46·20
Newgate Margate	19·73	14·14	13·70	14·70	1·30	6·83	70·40
Old Jewry	18·50	15·20	7·70	13·33	0·94	4·93	60·27
St. Mary-Axe	23·47	19·93	12·57	20·74	1·13	5·53	83·37
St. Nicholas Olave Churchyard	21·03	29·17	31·87	38·36	1·20	8·10	129·73
St. Paul's Churchyard	20·60	15·20	9·47	20·80	1·10	4·10	71·27
East London Water Company	12·00	2·42	1·32	1·52	0·50	0·40	18·16
New River Water Company	11·49	1·94	1·06	2·05	0·42	0·20	17·16

ON THE FUTURE WATER SUPPLY OF LONDON.

By GEO. WILLOUGHBY HEMANS, Esq., C.E., & RICHARD HASSARD, Esq., C.E.

The ideas on which the following project is based have been for a long time under consideration, and the descriptive particulars were actually preparing for circulation when the public were presented with the views on this subject of a very eminent gentleman, Mr. Bateman, C.E., in the form of a pamphlet, ably written and extensively circulated, and which has already attracted a large amount of remark and approval.

It is felt, therefore, that these suggestions appear now somewhat at a disadvantage, particularly as the sources of water supply recommended would seem, at first sight, to demand works in length and extent of greater and more startling magnitude than even the already sufficiently bold project of Mr. Bateman, for bringing water to London from the Welsh hills at a distance of 183 miles. The sources herein recommended lie at a distance of 240 miles from London, but notwithstanding this increase of distance, we believe that when the subject is fully investigated, it will appear that our project—although involving an apparently larger outlay in the first instance—will, from the absolute certainty of the rainfall, the extraordinary purity of the water, the facilities afforded by the existing lakes for the construction of immense reservoirs, and from the revenue which may fairly be expected from the sale of water in the districts traversed by the aqueduct, be found the best and cheapest which has yet been proposed, and that ultimate economy will arise from its selection.

The future water supply of London, from its magnitude and importance, from the sanitary considerations involved in its successful elucidation, and having in view the enormous and rapidly increasing population which will afterwards be dependent upon it for one of the chief necessaries of life, is a question without parallel in the history of engineering in ancient or modern times.

Of the existing water supply little need be said; that it is imperfect and unsatisfactory, both on account of quality of water, the intermittent nature of the supply, and rate of charge, is admitted on all hands; whilst, from the peculiar circumstances of the case, it is scarcely possible for the water companies to afford a supply much larger in quantity, or better in quality, than that at present furnished; they have done their best to carry out the obligations imposed on them by the Acts of 1852, and have expended large sums in their attempts to do so; the limit they can attain has, however, been nearly reached, and if the metropolis is to have a supply of pure water, such as is now enjoyed by many of the provincial cities and large manufacturing towns in the kingdom, it is full time that measures should be taken to investigate the question, and secure a suitable district from which to obtain it, there being very few available localities now unappropriated, or which will not, owing to the growing necessities of this populous country, shortly be appropriated, for the supply of other towns and districts.

The population of London and its suburbs has increased of late years in such an extraordinary ratio—with the probability of at least this rate of increase being maintained—as to render it absolutely essential that any scheme now put forward should be designed so as to admit of a quantity of water, at least double the existing consumption, being brought to the metropolis, from time to time, as the requirements of the district demand additional supplies.

The population of the metropolis and suburbs may be taken at 3,000,000, and the quantity of water now actually supplied by the different companies at nearly 100,000,000 gallons daily.

Of this a very large proportion (about one-half) is extracted from the Thames above tidal influence, as required by the Acts of 1852, and such a serious diminution of the volume of water in the river flowing onwards to London has of late attracted great public notice, to which it is not necessary at present further to advert.

The following extracts from the Registrar-General's monthly reports, as published in the *Times*, will show the qualities of the waters so obtained, as well as those of the waters of the other sources from which the metropolis is now supplied.

Analysis of the Metropolitan Waters, in December, 1865, *by Professor Frankland, F.R.S., of the Royal College of Chemistry.*

Names of Water Companies.	Solid Matter in 100,000 parts of the Waters.	Organic and other Volatile Matter included in col. 1.	Amount of Oxygen required for oxidation of Organic Matter.	Degrees of Hardness.*		
				Permanent.	Temporary.	Total.
Thames Water Companies.						
Chelsea	28·00	1·52	·1942	7·0	9·1	16·1
West Middlesex	28·91	1·49	·1045	6·8	11·9	18·7
Southwark and Vauxhall	31·32	1·98	·1972	7·4	11·5	18·9
Grand Junction	29·51	1·91	·1722	7·4	11·0	18·4
Lambeth	29·06	1·08	·0842	8·8	7·6	16·4
Other Water Companies.						
Kent	37·45	0·61	·0070	8·8	17·4	26·2
New River	30·02	0·54	·0396	7·0	14·1	21·1
East London	33·90	1·56	·1274	7·2	15·0	22·2
South Essex	38·10	0·86	·0112	5·8	19·0	24·8

* The degree of hardness hitherto employed by chemists is that first proposed by Dr. T. Clark—viz., 1 grain of carbonate of lime, or its equivalent, in 1 imperial gallon of water, or 1 part in 70,000. The degrees of hardness used in the above table are readily converted into Clark's degrees by multiplying by 7, and then moving the decimal point one place to the left.

The table may be read thus: 100,000 lbs. of the Chelsea water contained 28·00 lbs. of solid matter, of which 1·52 lb. of organic and other matters were driven off by incineration. ·097 lb. of oxygen were required to destroy organic matter in the said quantity of Chelsea water. Of the solid matter, 16·1 lbs. are carbonate of lime or its equivalent; of which 9·1 lbs. are got rid of by boiling, and 7·0 lbs. remain.

With the exception of the water supplied by the Kent and South Essex Companies, the waters again exhibit this month a marked increase in the total amount of solid impurity as compared with last month; this applies also to the water supplied by the Lambeth Company, which was the only one which, in October, showed no increase of residue over the preceding month. On the other hand, the organic and other volatile matter has (with the exception of the water supplied by the Grand Junction Company) decreased; while the amount of oxygen required for oxidation of the organic matter is in most cases less than in November.

The waters of the Chelsea, Lambeth, Southwark, Grand Junction, and East London Companies were turbid when drawn from the companies mains.

The second column of this table contains the amount of solid matter left on evaporation and desiccation at 120° C.—130° C. (248° F.—266° F.).

The results are recorded in 100,000 parts. By moving the decimal point one place to the right, the above figures express in milligrams the quantities contained in 1 kilogram of the several waters.

In February, 1866.

Names of Water Companies.	Number of Houses supplied in Jan., 1866.	Average daily Supply of Water in Gallons during Month of Jan., 1866. (See note.)	Solid Matter in 100,000 parts of the Waters.	Organic and other Volatile Matter included in column 4.	Amount of Oxygen required for oxidation of Organic Matter.	Total Hardness.*
Thames Water Companies.						
Chelsea	26,436	7,658,800	31·14	2·59	·0912	21·1
West Middlesex	35,486	7,657,423	30·40	2·00	·0739	19·8
Southwark and Vauxhall	73,594	12,125,000	30·90	2·40	·0643	20·7
Grand Junction	25,308	8,067,112	31·40	1·60	·0555	22·2
Lambeth	35,420	7,620,200	31·16	1·65	·0592	21·0
Other Sources.						
Kent	32,412	5,376,676	37·92	1·80	·0104	27·4
New River	111,864	22,330,000	29·50	1·68	·0576	22·0
East London	88,340	17,592,000	32·78	1·68	·0636	23·1
South Essex	750	161,000	40·60	1·36	·0086	26·5

* The degree of hardness hitherto employed by chemists is that first proposed by Dr. T. Clark—viz., 1 grain of carbonate of lime, or its equivalent, in 1 imperial gallon of water, or 1 part in 70,000. The degrees of hardness used in the above table are readily converted into Clark's degrees by multiplying by 7, and then moving the decimal point one place to the left.

Note.—The quantities of water here given include the supply for manufactures and for various purposes other than domestic consumption. The table may be read thus: The Chelsea Water Company supplied 26,430 houses, and an average daily quantity of 7,658,800 gallons in the month of January; 100,000 lbs. of the Chelsea water in February contained 31·14 lbs. of solid matter, of which 2·59 lbs. of organic and other volatile matters were driven off by incineration. ·0912 lb. of oxygen was required to destroy organic matter in the said quantity of Chelsea water. 21·1 lbs. are carbonate of lime or its equivalent. The fourth column of this table contains the amount of solid matter left on evaporation and desiccation at 120°. C.—130 C. (248 F.—266 F.). The results are recorded in 100,000 parts. By moving the decimal point one place to the right, the above figures express in milligrams the quantity contained in one kilogram of the several waters.

In comparison with the month of January, the majority of the waters exhibit an increase in the total amount of solid impurity; the West Middlesex, New River, and East London Companies waters form the only exceptions to this rule. The amount of organic and other volatile matter is also greater in all the waters, except those of the Grand Junction, Lambeth, East London, and South Essex Companies. Lastly, a larger quantity of oxygen is required for the oxidation of the organic matter than in the preceding month; the Chelsea, Grand Junction, South Essex, and Lambeth Companies waters only being excepted.

The waters of the Chelsea, Southwark, Lambeth, New River, and East London Companies were turbid when drawn from the companies mains.

The analysis for January was not published, but it will be evident from the remarks in that for February, that the water must have been of a quality similar to that of the preceding and following months.

It will be apparent, also, from the above statements, that as regards six of the water companies, for some periods of the year, at all events, private filtration would be necessary (it is, in fact, extensively practised) to ensure to the consumers a bright and potable water.

Taking, for example, the month of February, it would appear that out of a total daily average supply of 88,588,211 gallons, no less than 67,326,000 gallons, or more than three-fourths of the whole, were delivered to the consumers in a turbid state.

The attributes of the future supply must be, quantity, purity, and softness, with distribution at high pressure, on the constant system.

It would not be prudent, therefore, to provide for an eventual supply of less than 250,000,000 gallons daily—that is, 200,000,000 gallons for the metroplitan districts proper, and 50,000,000* gallons for sale to districts traversed by the aqueduct in *transitû* into London.

Experience has hitherto shown that the largest water-works are in the end the cheapest; and those which furnish the largest quantity, and combine a supply for trading and manufacturing purposes, with that for domestic and private consumption, invariably supply water at the lowest rate, to the ordinary consumer—that is, to the public at large.

This project is therefore put forward for the supply, not only of London, but, where necessary, of the vast population lying between the districts from which it is proposed to obtain the water, and the metropolis itself; and in these intermediate districts lie the populous and thriving towns of Lancashire, of the Potteries, and of the Midland Counties.

By such an arrangement, it is obvious that the cost to all parties will be materially lessened.

To obtain this necessarily great quantity of water, of requisite purity and softness, we must seek a district of considerable area, free from peat and contamination of every kind, where the rainfall is large, and ascertained beyond doubt by a long series of observations, and where facilities exist for storing up the surplus waters of wet seasons, at such altitudes as to permit of the supply being drawn off and conveyed to London by gravitation, and of being delivered there at about 220 feet above high water; using in all cases where practicable the existing covered service-reservoirs, and, failing these, covered service-reservoirs to be constructed in such localities as may be found on investigation most advantageous for utilizing the present pipes and works of distribution.

This altitude of about 220 feet for distribution would be most convenient and suitable for the entire of the metropolitan districts, would ensure an ample pressure for ordinary domestic supply and in case of fire, and would avoid the abandonment and destruction of the existing appliances of distribution, which would be entailed by the use of a much higher pressure, and by the adoption of a different system of service; in fact, the metropolis is so large as to preclude its being dealt with otherwise than in districts, excepting by the abandonment of a great portion of the present works and pipes, involving an obnoxious and undesirable expenditure.

There are, it is true, some elevated suburban districts for the service of which it would still be necessary to raise water by pumping, but these could not, under any circumstances, be included in a project for the supply of the metropolitan districts by gravitation, and their area is comparatively so small that it is scarcely necessary to notice them in the consideration of this important subject.

Those well known mountain ranges of the counties of Westmoreland and Cumberland draining into the rivers Lowther, Eamont, and Greta, and adjoining the lakes of Haweswater, Ullswater, and Thirlmere, possess all the attributes of a locality from which an enormous amount of the purest possible water may be obtained; and the existing lakes can easily and at small expense be adapted to form immense reservoirs for its conservancy and storeage, at convenient altitudes for the water to be drawn off and conveyed by gravitation to London.

By this process of conservancy the expense and inconvenience of constructing such a number of wholly artificial reservoirs, as would otherwise be necessary for the storeage of the immense requisite quantity of water, will be obviated.

The area from which water is herein proposed to be collected extends over 177 square miles, the altitudes varying from 500 to 3200 feet above the sea. These, however, are the extremes; the mean altitude will probably be 1300 or 1400 feet above sea-level.

The entire district is bare hill pasture and rock of the primitive formations, and excepting a small area, in the vicinity of Ullswater, which can easily be excluded from the scheme, is free from mineral workings or other sources of contamination, and the waters are of remarkable purity and softness, as the following analyses by and letter from Professor Way will show:—

Grains per Imperial Gallon.

	River Lowther.	Haweswater Lake.	Ullswater Lake.	Thirlmere Lake.
Lime	1·54	0·50	0·81	0·42
Magnesia	0·50	0·18	0·20	0·14
Soda	0·80	0·71	0·51	0·46
Chlorides of sodium and potassium	0·48	0·40	0·69	0·77
Oxide of iron, silica, &c.	0·50	0·25	0·20	0·05
Sulphuric acid	0·51	0·51	0·37	0·44
Carbonic acid	2·05	0·82	1·03	0·56
Organic matter.	0·62	0·62	0·35	0·77
Total impurity	7·00	3·99	4·16	3·61
Hardness before boiling	5·2°	2·0°	2·1°	1·5°
Hardness after boiling	4·4°	1·8°	2·1°	1·5°

These substances are probably combined as follows:—

Grains per Imperial Gallon.

	River Lowther.	Haweswater Lake.	Ullswater Lake.	Thirlmere Lake.
Carbonate of lime	2·75	0·90	1·45	0·75
Carbonate of magnesia	1·05	0·36	0·42	0·29
Carbonate of soda	0·70	0·56	0·40	0·20
Sulphate of soda	0·90	0·90	0·65	0·78
Chlorides of sodium and potassium	0·48	0·40	0·69	0·77
Oxide of iron, silica, &c.	0·50	0·25	0·20	0·05
Organic matter.	0·62	0·62	0·35	0·77
Total solid matter	7·00	3·99	4·16	3·61

106, *Leadenhall Street, E.C., March* 21, 1866.

Dear Sir,—I enclose the analyses of the waters of the river Lowther and of the three lakes, Haweswater, Ullswater, and Thirlmere.

As might have been expected, none of them show more than a small proportion of solid matter per gallon; the river Lowther is the least praiseworthy on this account, though even that sample contains only 7 grains of total impurity per gallon.

The proportion of organic matter in all the samples is small; the water of the river Lowther is, however, slightly coloured, no doubt from peat.

The waters of the three lakes are as soft as any natural waters can be; the water of the river Lowther does not equal the others in this respect, but, as compared to the usual towns supplies, would be considered a soft water.

On the whole, I have no hesitation in saying that any one of these waters, or a mixture of them, would be admirably suited for the domestic supply of town populations, whether large or small.

I am, dear sir, yours truly,

G. W. Hemans, Esq., C.E. J. Thomas Way.

These results, although so favourable, exhibit the waters in their worst aspect and condition, the samples for analysis having been taken in January last, immediately after long-continued and heavy rains, and include the drainage from the small mineral district, which is intended to be excluded from the scheme.

On the subject of the sufficiency of the rainfall, no difference of opinion, happily, can arise.

The observations of the late Dr. Miller from 1847 to 1853, inclusive, as published in "Beardmore's Manual of Hydrology," give for the district and neighbourhood an average mean annual rainfall for that period of 100·56 inches, as will be apparent from the following table (No. 1).

It is a matter much to be regretted that the records of rainfall for this hill district, so carefully compiled up to 1853, should have been for the most part discontinued after Dr. Miller's death, as the years 1854 to 1859 inclusive were dry years, the mean annual rainfall of the ten years 1850 to 1859, as given by Mr. G. J. Symons, in his "British Rainfall" for 1863, as registered at the Seathwaite gauge, being 126·98 inches, as against 138·52 inches, the mean annual rainfall of the seven years ending 1853, and the mean annual rainfall at the Keswick gauge being 55·01 inches, as against 60·82 inches for the same period of time, being in the first case ·92 and in the second ·90 per cent. of the mean annual rainfall of the seven years ending with 1853, which was a very dry year.

The years 1864 and 1865 were also dry years, the latter, indeed, in the north-western counties, being one of extreme drought; the mean rainfall in the lake district for that year having been only 80·38 inches, or about 80 per cent. of the mean annual rainfall (100·56 inches) of the district for the seven years ending with 1853. (See table No. 3.)

* A small addition to the size and cost of the aqueduct would enable the provincial supply to be increased at any future time to 100,000,000 gallons daily.

TABLE No. 1.

Name of Station.	Keswick.	Lowes water.	Crummock Lake.	Gatesgarth.	Eskdale Head.	Wastdale Head.	The How Troutbeck.	Ambleside.	Langdale Head.	Scathwaite.	Stonethwaite.	The Pike.	Great Gable.	Sprinkling Tarn.	Brant Rigg.	Scatoller Common.	The Stye.
Height above sea.	Ft. 258	Ft. 336	Ft. 260	Ft. 290		Ft. 247	Ft. 503	Ft. 190	Ft. 250	Ft. 368	Ft. 340	Ft. 3166	Ft. 2925	Ft. 1900	Ft. 924	Ft. 1338	Ft. 948
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
Year 1847	58·28	66·30	82·32	106·20	74·90	96·30	78·00	..	112·90	129·20	106·20	..	..	..	..	..	—
1848	66·40	76·67	98·07	133·50	86·80	115·30	91·30	77·60	130·40	160·90	130·20	94·70	91·30	148·60	109·20	139·50	—
1849	48·80	55·28	70·21	97·10	71·20	107·20	75·40	65·30	107·80	125·30	94·30	83·20	84·90	121·10	87·30	109·00	—
1850	59·53	68·80	85·66	108·80	81·70	108·80	79·80	79·80	126·60	144·60	105·80	80·30	87·30	127·80	91·10	138·80	174·30
1851	62·32	67·10	84·08	107·00	78·60	97·90	80·80	84·20	116·80	139·66	114·10	71·30	85·70	134·80	89·50	141·40	169·60
1852	79·97	80·53	103·40	134·90	88·80	109·60	115·40	104·30	154·10	156·70	133·90	81·30	81·20	125·30	98·20	156·60	167·70
1853	50·44	59·61	72·09	99·10	63·10	83·40	66·00	66·30	..	113·70	95·60	56·20	59·70	94·60	73·40	111·40	124·90
Total rain	425·74	474·29	595·83	786·60	545·10	718·50	586·70	477·50	728·60	969·60	780·10	467·00	490·10	752·20	548·70	796·70	636·50
Mean annual rainfall	60·82	67·75	85·12	112·37	77·87	102·64	83·82	79·58	121·43	138·52	111·44	77·83	81·68	125·37	91·45	132·78	159·12

Mean annual rainfall of the whole district for the above periods, 100·56 inches; and for the very dry year, 1853, 80·60 inches.

Table No. 2, also from Beardmore's "Manual of Hydrology," giving the number of days rain which actually fell during the seven years from 1847 to 1853 inclusive, at several of the stations enumerated in the foregoing table.

TABLE No. 2.

Name of Station.	Keswick.	Lowes water.	Crummock Lake.	Wastdale Head.	The How Troutbeck.	Ambleside.	Scathwaite.	Stonethwaite.
Height above sea	Ft. 258	Ft. 336	Ft. 260	Ft. 247	Ft. 503	Ft. 190	Ft. 368	Ft. 349
	Days.	Days.	Days.	Days.	Days.	Days.	Days.	Days.
Year 1847	204	190	199	226	188	..	202	196
1848	229	217	207	243	201	..	332	224
1849	205	191	185	236	186	159	193	183
1850	209	196	204	248	185	182	222	199
1851	211	202	206	232	195	178	219	206
1852	204	201	194	212	202	204	221	207
1853	172	189	183	203	173	149	217	191
Mean number of days rain per year	205	198	197	228	190	174	229	201

Giving in the whole district a mean number of 202·75 days rain in each of the foregoing years.

In addition to the foregoing information, we have the following table, No. 3, of rainfall for the six years 1860-65, as compiled by Mr. G. J. Symons, and published in "British Rainfall":—

TABLE No. 3.

Name of Station.	Scafell Pike.	Wastdale Head.	Brant Rigg.	Sprinkling Tarn.	Styehead Tarn.	The Stye.	Scathwaite.	Stonethwaite.	Keswick.	Lancrigg-in-Grasmere.	Ambleside.	Lesketh Howe.	Windermere Howe.	Ambleside Loughrigg.	Patterdale House.	Lowther Castle.	Ensemere Hill, Ullswater.
Height above sea.	Ft. 3200	Ft. 247	Ft. 695	Ft. 1985	Ft. 1472	Ft. 1077	Ft. 422	Ft. 336	Ft. 270		Ft. 150	Ft. 200	Ft. 470	Ft. 570	Ft. 500	Ft. 840	Ft. 560
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
Year 1860	..	..	..	..	..	..	142·29	..	54·17	104·87	..	79·97	102·58	..	..	45·33	—
1861	..	..	..	..	..	..	182·58	..	74·42	123·22	..	98·03	116·26	..	..	..	—
1862	..	..	..	..	..	..	170·03	..	61·37	..	..	88·26	94·27	..	..	..	—
1863	..	..	..	..	..	..	173·84	..	71·54	..	..	81·69	84·97	..	..	45·76	50·45
1864	73·20	86·78	7·21	119·32	108·73	..	134·67	100·76	52·68	..	74·40	74·19	75·74	74·63	61·49	35·08	—
1865	49·12	75·73	68·27	103·84	99·85	149·07	117·49	84·13	49·18	..	65·78	65·80	64·05	71·00	61·99	..	—

Mean rainfall of the district in the year 1864 = 81·99 inches.
" " 1865 = 80·38 "

These last are rather lower than the true mean rainfall, owing to there not having been a gauge at the Stye in the year 1864, and owing to the Scafell gauge being rendered useless from snow during the greatest portion of the first three months of 1865.

In estimating for the supply of London and the intermediate towns, the water-producing capabilities of the district, we take it, to avoid question, at somewhat less than its minimum—viz. at 80 inches.

In a precipitous hill and rocky district, such as this, the loss from evaporation and absorption will be small, probably not more than 12 inches; we take it, however, at 14 inches, leaving 66 inches as the minimum depth of available rain during a continuous period of dry seasons.

This would be equivalent to a supply of 464,719,562 gallons daily throughout the year, and is a quantity much larger than required, or indeed than could be conveniently dealt with.

It is proposed, therefore, to limit the supply from this district to 250 million gallons daily, and to give as compensation a quantity nearly equivalent to one-third of the abstracted rain—viz., 450,000 gallons daily for each square mile of drainage-area.

By such an arrangement, the floods now running to waste would be to a great extent controlled, and the dry weather yield of the district probably doubled in volume.

It will be evident that the district is capable of supplying a far larger quantity of water than that which it is proposed to take from it; in fact, the main cost of the project would be incurred, not in collecting and impounding the water, but in conveying it from its native district to the places of consumption.

The descriptive particulars of the project are as follows, and will best be understood by reference to the map:—

The districts from which water is proposed to be taken, with two small exceptions, lie on the northern slopes of the range of hills towering over Grasmere, Windermere, and Kendal, and draining into the rivers Lowther and Greta, and into the lakes of Haweswater, Ullswater, and Thirlmere.

On the eastern side of the collecting-ground the works would commence on the river Lowther, at Cooper's Green, in Sleddale, by an intercepting conduit, passing from thence round the hills to Swindale, where the first auxiliary reservoir would be constructed, and on to Haweswater, the surface of which would be raised 42 feet, or to 736 feet above the Ordnance datum.

From the north end of Haweswater another intercepting conduit would be constructed, passing round the eastern slopes of Bampton Common, and conveying to that lake the waters of the Hows Beck, Gill Beck, and Heltondale Beck streams.

A third conduit or watercourse would be constructed from the river Lowther, commencing at a point about 1½ mile below the village of Askham, passing round the hill to the west of Clifton, along the eastern slope of the valley of the river Eamont, and terminating at the north end of Ullswater, into which lake and into the river Eamont it would deliver at Pooley Bridge.

These three conduits would intercept all the waters of the river Lowther and its tributaries above Clifton, and conduct them into the Swindale auxiliary reservoir, and into the Haweswater and Ullswater Lakes.

From the north-western end of Ullswater a conduit would be constructed to Dacre Bridge, which would intercept and conduct into it the waters of the Dacre Beck and its tributaries.

Thirlmere would be raised 64 feet, or to 597 feet above the Ordnance datum, and from its northern extremity conduits or catchwater drains would be constructed in easterly and westerly directions; the first named would pass round the northern slopes of Matterdale Common, and intercept the waters of the Mosedale Beck, Trout Beck, and Barrow Beck streams, and complete a zone of intercepting conduit and watercourse between the northern extremities of Ullswater and Thirlmere Lakes.

The other conduit or catchwater drain would pass round Bleaberry Fell, and along the edge of the table-land east of Watendlath, and extending up to the Blea Tarn would intercept all the upper waters of the Watendlath and Coldbarrow Fells.

By constructing a tunnel from the south end of Thirlmere, under Dunmail Raise Pass, and some short intercepting conduits from its southern extremity, the waters of about six square miles of a very wet district on the southern face of the hills may be conducted to and impounded in that lake.

When Thirlmere is full, or the streams in flood, the waters may be passed into a reservoir to be constructed on St. John's Beck, immediately below

that lake, where they would be impounded, and given out as compensation to the millowners on the river Greta, at and above Keswick; when both are full, the surplus waters may be passed into Ullswater, which, with the auxiliary reservoirs to be constructed in Martindale, would, in conjunction with Thirlmere, be used for towns supply only.

The waters of the river Lowther, although of admirable quality, are the least desirable in the scale of excellence, and it is proposed to use them mostly for compensation, passing them in the first instance down the river Lowther itself to a point 1½ mile below Askham, from whence they would be conveyed by a new channel to Pooley Bridge, and there delivered into the river Eamont.

The water supplied to London and the intervening towns would be taken almost entirely from Ullswater and Thirlmere Lakes, and would be of extraordinary purity and excellence, being under two degrees of hardness, and containing, per imperial gallon, not more than about 4 grains of total impurity, of which scarcely more than half a grain would be organic matter

Haweswater and Thirlmere are lonely and unfrequented lakes, occupying deep valleys, embosomed in mountains, and afford admirable sites for the construction, at comparatively trifling expense, of immense reservoirs, to which additional supplies of water can with great facility be conducted.

The particulars of the reservoirs, would be as follows:—

Name.	Area of Collecting Ground in Square Miles.	Area of Reservoir in Acres.	Content in Cubic Feet.		Total Storeage.
			For Supply to Towns.	For Compensation.	
Swindale . .	38	166	...	187,000,000	187,000,000
Haweswater . .		683	235,200,000	961,100,000	1,196,300,000
Martindale . .	93	255	336,000,000	...	336,000,000
Ullswater . .		2300	1,742,400,000	...	1,742,400,000
Thirlmere . .	*	875	1,721,977,600	...	1,721,977,600
St. John's Beck Reservoir . .	44	360	...	380,000,000	380,000,000
	177	4639	4,035,577,600	1,528,100,000	5,363,677,600

* If thought desirable, the waters from a further area of about 8 square miles draining into the Airy Beck and Dacre Beck, and now flowing into Ullswater, can easily be diverted and conveyed to Thirlmere.

equal to 129 days supply at 250 million gallons per day, and to 157 days supply at 200 million gallons per day—after giving credit for the average minimum summer yield, which will not be less than 40 million gallons per day—and to 120 days compensation at 450,000 gallons per square mile of drainage-area; this will more than suffice in a district of such constant rain.

There would not be any necessity, in the first instance, for constructing the auxiliary reservoirs in Swindale and Martindale, as until the towns supply exceeded 200 million gallons per day, Thirlmere and Ullswater would contain sufficient storeage, and would be able, after giving credit for the summer yield, to work up to 135 days supply, whilst compensation water would be given out from Haweswater and from St. John's Beck reservoirs; when the demand exceeds 200 million gallons per day, these auxiliary reservoirs may be constructed, and, if necessary, others in addition, as many sites are available; should the demand eventually exceed 250 million gallons per day, a further area of 53 square miles of collecting-ground may be obtained on the southern slopes of the range of hills above Ambleside and Kendal, by constructing reservoirs in the valleys traversed by the Troutbeck, the Kent, the Sprint, and the Bannisdale Beck streams, and an additional quantity of about 75 million or 80 million gallons daily may be easily obtained from these sources of supply.

As to the capability of the district, no doubt therefore can exist, and it is worth consideration whether it might not be the wisest course in the first instance to construct those portions of the aqueduct, which cannot be added to from time to time, of sufficient capacity for this extended supply.

The surface of Ullswater Lake would be ordinarily maintained at or about its winter level, and water drawn off from it for towns supply at a depth of 20 feet, that is at about 460 feet above the Ordnance datum; the shores, however, are mostly of a steep and precipitous nature, and any injury to the scenery, or aspect of the lake, would be more of a fancied than real nature.

Of course it would be impossible to carry out a scheme of this magnitude without doing some injury, but in the construction of these great reservoirs, it would be reduced to a minimum; for instance, for Haweswater and Thirlmere, the total area of additional land required would not be more than about 750 acres; and there would be no residential damage. The number of houses which would be affected would not exceed 17 or 18, all of which, excepting three or four, are of the most ordinary class; and they can all, if necessary, be re-erected round the extended margin of the lakes.

At Ullswater, the injury done, if any, would be very trivial. As long as the demand from the district did not exceed 200 million gallons per day, it would not be necessary to lower Ullswater at all, until after a period of 67 days of absolute drought; Thirlmere being able to keep up the supply for that period of time; it would then take about 30 days more to lower Ullswater 8 feet, which would not be very much below its summer level; so that under these circumstances 97 days of continuous and absolute drought must occur before Ullswater would be sensibly affected.

When the demand has increased to 250 million gallons daily, and the auxiliary reservoirs have been constructed, with their aid the towns supply could be kept up from Thirlmere for a period of 70 days, and it would then take 23 days more to reduce Ullswater 8 feet, so that in this case 93 days of continuous and absolute drought would be necessary before the lake was reduced much below its summer level; and there is no record of drought of any such duration ever having occurred in this notoriously wet locality.

On this subject, we are indebted to Mr. Samuel Marshall, of Kendal, who has been a careful observer of rainfall there since 1822, for the following valuable information:—

The longest period of drought in this locality (Kendal), during the last 44 years, occurred in the spring of 1852, which, singularly enough, was also here the wettest year during that period.

From the 19th of February to the 29th of April there but three were days on which rain fell, and the aggregate fall was only 0·21 inches, being a period of 70 days with less than a quarter of an inch of rain.

The droughts next approaching this in duration occurred as follows:—

In 1861, from the 1st of April to the 8th of June—a period of 69 days—there were but nine days on which rain fell, with an aggregate fall of 1·65 inches.

In 1839, from the 28th of March to the 4th of June—a period of 67 days—there were but 12 days on which rain fell, with an aggregate fall of 1·97 inches.

In 1826, from the 28th of April to the 28th of June—a period of 60 days—there were but eight days on which rain fell, with an aggregate fall of 1·12 inches.

In 1829, from the 14th of December to the 9th of February, 1830—a period of 55 days—there were but five days on which rain fell, with an aggregate fall of 0·65 inches.

The years 1844, 1853, 1864, and 1865 were also dry years, but with droughts of much shorter duration than those above mentioned.

It must be borne in mind also that Mr. Marshall's observations relate to the rainfall at Kendal, which in many cases is not more than one-half of that in the mountainous districts above, where there is often a considerable amount of rain whilst it is fine weather in the low country adjoining.

The water from Thirlmere would be drawn off at its northern extremity, and conveyed to Ullswater by conduit and tunnel; the tunnel would be eight miles in length, but shafts can be put down over the entire distance, and in such a case it is obvious there would be no greater difficulty in constructing a long tunnel than a short one; it is simply a question of greater length and of additional shafts.

From Ullswater the supply would be drawn off from the south end of the lake at Patterdale, and from thence carried by tunnel under Kirkstone Pass.

This tunnel would be the only work of unusual magnitude connected with the project; it would be 7½ miles in length, but of this 5½ miles would be ordinary and rather shallow tunnel, and would therefore present no difficulty; the central portion immediately under Kirkstone Pass would be 1½ mile in length between the shafts, and would, at the rate of progress which has been effected at the Mont Cenis tunnel, occupy in its construction about three years after the shafts were sunk.

No doubt, with the rock-boring machines of the present day, it might easily be completed in that or a less period of time.

From the south end of the tunnel the water would be conveyed to London by conduit, tunnel, and iron pipes; the aqueduct would pass by Ambleside and Kendal, and down the eastern side of Lancashire, avoiding the Wigan coalfield, to the east of Manchester and the Potteries district, and to the east of the Staffordshire coalfield and of Birmingham, and onwards towards London, following a route nearly parallel with that of the London and North-Western Railway, and would terminate in a large regulating reservoir to be constructed to the north of Harrow, at a distance of about 12 miles from Cumberland Gate, Hyde Park.

The project may, in fact, be briefly described as an aqueduct, or arterial conduit, deriving its supply from the great rainfall and natural reservoirs of the lake country, passing through the heart of England, and capable of affording, *in transitu*, a practically unlimited quantity of the purest possible water to the vast manufacturing districts and population on the line of its route, as well as to the metropolis itself.

Some portions of the project and of the aqueduct may be carried out in detail, as the demand for water increases from time to time.

We now come to the consideration of the financial part of the scheme.

Of late years it has been pretty well recognized that all great projects, of this and similar natures, should be the property of the communities to whose necessities they minister—or, in other words, that the consumers should be the proprietors of their own works, and guardians of their own interests.

It is also now equally recognized that the rates for water supply and drainage should be compulsory, and extend to all property within the area benefited. In different localities the rates are differently apportioned, but the principle is almost universally practised, and has been adopted in many large provincial cities and towns with great public advantage; it should, we conceive, *à fortiori*, be extended to the metropolis, and the water supply placed under the control of the Metropolitan Board of Works, or of a similar board to be elected for the purpose from the ratepayers themselves.

In this case, it would of course be necessary to purchase the existing water-works, and incorporate them with the new project, securing to the different companies the net incomes they at present enjoy.

We learn from the pamphlet recently published by Mr. Bateman, C.E., on the water supply of London, that these in the aggregate amount to rather more than £400,000 per annum, whilst their gross receipts are about £700,000, or nearly 1s. in the pound on the present rateable value of property in the metropolis, which amounts to about £15,000,000 annually, and this would no doubt reach to a much larger amount by the time these proposed works were completed. We shall call it, then, £16,000,000, although, judging from the late ratio of increase, this would evidently be below the mark.

The cost of the project complete, for a daily supply of 250 million gallons we estimate at £12,200,000.

As, however, there would be no necessity for bringing the whole of this large quantity of water before the demand for it had actually arisen, we shall assume that 200 million gallons only are brought in the first instance. That is—

	Gallons.
For domestic consumption	120,000,000
For public and trading purposes	30,000,000
For sale to population on line of conduit	50,000,000
Total	200,000,000

The cost of which would be—

Conduits, reservoirs, and works of collection . . .	£ 675,000
Tunnel from Ullswater to Ambleside	350,000
Aqueduct to London	8,125,000
Regulating reservoir, &c., near London	500,000
	£9,650,000
Interest on unproductive capital during an average period of three years, and other expenses . . .	1,550,000
	£11,200,000

The annual expenses would probably be—

Interest on £11,200,000, at 4 per cent.	£448,000
Collection, management, and casual repairs . . .	100,000
Present dividends to water companies	425,000
	£973,000

To meet this we should have, after the works have been for some few years fairly in operation, a probable income of—

From the sale of 50 millions of gallons daily, to towns, &c., on the line of aqueduct, at 3d. per 1000 gallons	£228,125
From the sale of 30 millions of gallons daily in London, for public and trading purposes, at 3d.* per 1000 gallons	136,875
From an average rate of 10d. in the pound, on a property of £16,000,000	666,666
	£1,031,666

which is £58,666 in excess of what is required, as shown above.

In the estimate of income, no credit is taken for the annual value of the assets and property of the water companies, which it would not be necessary to retain after the introduction of the new water supply.

This average rate of 10d. in the pound may be levied as may be deemed most equitable, say a 9d. rate for domestic consumption on an assumed house property of £12,000,000, and a public rate of 3d. on a total property of £16,000,000; this would amount—

For the domestic rate, to	£450,000
For the public rate, to	200,000
Total	£650,000

which would probably suffice.

It is not, however, to be expected that the 50 million gallons daily proposed to be sold to the towns and populations on the line of the aqueduct could be disposed of all at once, and, in estimating the rates likely to be levied on the citizens of London, we must take that into account, and we shall now consider the question as if no water were so disposed of.

This would leave a sum of £973,000 — £136,875 = £836,125, to be levied on the metropolis, and would amount to an average rate of rather more than 12½d., say 1s. 1d., in the pound on all property; this would be the maximum rate which, under the most unpropitious circumstances, it would be necessary to levy, and which would not amount to more than the actual rate now levied on property in the metropolis by the existing water companies.

It is more than probable, however, that by the time these works were completed the rateable value of the metropolitan districts would amount to £18,000,000, of which probably three-fourths, or £13,500,000, would be house property, and in this case, if no water were sold on the line of aqueduct, the rate necessary to be levied would amount to about 11¼d. in the pound.

If the rateable value amounted to £18,000,000, and 25 million gallons were sold daily on the line of the aqueduct, the necessary metropolitan rate would amount to nearly 9¾d., say 10d., in the pound.

If, however, the sale of water on the line of aqueduct had increased to 50 million gallons daily, and the rateable value of the metropolitan districts had increased to £20,000,000—events by no means improbable—the average necessary rate would not then amount to more than about 7½d., say 8d., in the pound, and this would gradually be diminished as the rateable value of the metropolitan districts, caused by suburban extensions, and the springing up of a new and better class of property in the metropolis itself, progressed; and to meet the future demands likely to arise from these and other causes, there would remain a further quantity of 50 million gallons daily, to be supplied at an outlay of £1,000,000, which may be expended when the necessity arises.

On the subject of diminution of disease, of poor-rates, of fire insurance, and of taxation generally, consequent on the introduction of a plentiful supply of pure water, no remarks are necessary; such results are too well known to require comment.

We trust we have shown that not only is London within the pale of an admirable supply, but that water of extraordinary purity and excellence may be readily procured and distributed to its inhabitants, at rates of charge at least equally moderate with those at which other large towns are supplied, and under no circumstances exceeding the rates levied for the present intermittent and unsatisfactory supply.

In the autumn of last year, when the plans and general features of this scheme were nearly matured, a letter from Mr. G. J. Symons, the well-known meteorologist, appeared in one of the public journals; in it was mentioned the feasibility of procuring water from the Westmoreland and Cumberland Hills, for some districts in Lancashire at that time suffering from drought, and since then the subject appears to have been taken up by Mr. Dale, C.E., of the Hull Corporation Water-Works; some particulars of a project for the purpose put forward by that gentleman having appeared from time to time in the scientific journal, known as *Engineering*.

Mr. Dale's project, as far as we can gather, is to supply a number of towns in Lancashire and Yorkshire, from Haweswater and Ullswater Lakes; but, excepting in the circumstance of these lakes being included in our scheme, and forming a portion of it, there is no similarity or affinity between the respective projects.

DR. HILLIER'S REPORT ON THE GAS SUPPLIED BY THE IMPERIAL COMPANY TO THE VESTRY OF ST. PANCRAS DURING THE MONTHS OF JULY AND AUGUST, 1866:—

Maximum light estimated by sperm candles according to the Act	15·0
Minimum light—sperm candles	12·9
Average light—sperm candles	14·1
Traces of ammonia, indicated by turmeric test-paper	Constantly.
Traces of sulphuretted hydrogen, indicated by lead test-paper	None.

During the months of July and August, owing to the pressure of other work, I have only examined the gas twelve times. It has on each of these occasions been in conformity with the requirements of the Act of Parliament, except as regards the presence of ammonia.

A GRATUITOUS SUPPLY OF GASLIGHT.—For the last three months or so Mr. Blyth, mining engineer, has been employed, on behalf of Mr. Dixon, Govan Colliery, prosecuting a bore in search of ironstone on the estate of Sir William Stirling-Maxwell, of Pollok. For the last week it has been known to the workmen that gas or fire-damp has been escaping from the bore, and a few days ago they had to extinguish an inconsiderable jet of it which had been accidentally ignited. On Thursday morning a more serious occurrence of the same nature took place. One of the borers had sat down on a tool-chest situated about 40 feet from the bore, and proceeded to light his pipe. No sooner was the match struck than he was enveloped in a sheet of flame, but he was only slightly burnt on the hands and face. The fire was conducted to the fountain-head at the bore, and there it was raging on Thursday night, and should no effectual means be found to put it out, it is the opinion of skilled persons that it may burn on for a long period—months, perhaps years. When the fire broke out the workmen endeavoured with stout iron rods, which they used as rammers, to stop up the bore, but so strong was the rush of gas that three or four sturdy men were knocked aside. A cast-iron boiler, weighing several hundredweight, was then thrown on the top of the flame, but it was instantly rent and tossed into the air. The boring apparatus having taken fire had to be torn down, and the rods left in the bore, which is 2¼ inches, and has now attained a depth of 420 feet, and passed through the sandstone strata. There is every confidence that the rods will be recovered uninjured on the fire being got under, and it is only on the gas coming to the surface and into contact with the air that combustion begins. The roaring of the flames, which reach from 20 to 30 feet in height, is very loud, and similar to that produced by the letting off steam from a high-pressure boiler. By a telegram from our Glasgow correspondent, we learn that the fire died out yesterday, and that means have been taken to prevent the gas being again ignited. The boring operations will be suspended for a day or two.—*Scotsman.*

* Only about one-half the price usually charged.

ANALYSIS OF THE METROPOLITAN WATERS FOR JULY, 1866, BY PROFESSOR FRANKLAND, F.R.S., OF THE ROYAL COLLEGE OF CHEMISTRY:—

Names of Water Companies.	Number of Houses supplied in June, 1866.	Average daily Supply of Water in Gallons during Month of June, 1866. (See note.)	Solid Matter in 100,000 parts of the Waters.	Organic and other Volatile Matter included in column 4.	Amount of Oxygen required for oxidation of Organic Matter.	Total Hardness.
Thames Water Companies.						
Chelsea	26,463	8,393,700	25·40	1·57	·0504	16·5
West Middlesex	35,707	8,742,130	24·72	1·58	·0516	16·2
Southwark and Vauxhall	73,823	12,175,000	25·25	1·55	·0396	16·5
Grand Junction	25,636	9,367,654	25·14	1·26	·0548	17·1
Lambeth	36,175	9,219,500	25·25	1·71	·0560	16·2
Other Sources.						
Kent	32,766	6,282,400	40·42	1·58	·0097	24·5
New River	112,053	23,232,000	20·58	0·58	·0212	13·4
Do., after filtration through animal charcoal	..	..	19·58	0·12	·0072	11·4
East London	88,340	19,000,000	24·38	1·94	·0344	16·0
South Essex	750	160,000	40·94	1·96	·0120	23·4

* The degree of hardness hitherto employed by chemists is that first proposed by Dr. T. Clark—viz., one grain of carbonate of lime, or its equivalent of hardening salts, in one imperial gallon of water, or one part in 70,000. The degrees of hardness used in the above table are readily converted into Clark's degrees by multiplying by seven, and then moving the decimal point one place to the right.

Note.—The water includes the supply for manufactures and for various purposes other than domestic consumption. This return, as compared with that for the previous month, shows an increase of 276 houses and an increase of 3,218,926 gallons of water supplied daily. The table may be read thus:—100,000 lbs. of the Chelsea water contained 25·4 lbs. of solid matter, of which 1·57 lb. of organic and other volatile matters was driven off by incineration. 0·0504 lb. of oxygen was required to oxidize the organic matter in the said quantity of Chelsea water. Of the solid matter 16·5 lbs. were carbonate of lime or its equivalent of hardening salts.* The fourth column of this table contains the amount of solid matter left on evaporation and desiccation at 120 deg. C.—130 deg. C. (248 deg. F.—266 deg. F.) The results are recorded in 100,000 parts. By moving the decimal point one place to the right the above figures express in milligrammes the quantities contained in one kilogramme of the several waters. The whole of the waters were free from turbidity when drawn from the companies mains.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE GAS SUPPLIED IN ST. MARYLEBONE, IN JULY, 1866:—

JULY.	Illuminating Power in Sperm Candles.			Mean Pressure in 10ths of an inch.	
	*Mean of 26 Observations.	Highest.	Lowest.	Highest.	Lowest.
Imperial Company's gas	14·59	15·45	14·00	26·07	8·16
Chartered Co.'s common gas	13·08	13·99	12·15	30·08	13·31
Chartered Co.'s cannel gas	20·98	23·15	20·08	28·82	11·87

* Each observation consists of 10 readings of the photometer.

During the past month the illuminating power, pressure, and quality of all the gases have been satisfactory. On no occasion has the intensity of light of either of them been less than the standard, but generally from 1 to 3 candles above it. The mean quantity of sulphur in 100 cubic feet has been unusually small, and this applies to the gas of both companies. The above results are obtained from the Imperial Company's gas at their Fulham works, and from the Chartered Company's common and cannel gas manufactured at their works in the Horseferry Road, Westminster.

DR. WHITMORE'S REPORT ON THE QUALITY OF THE WATER SUPPLIED IN ST. MARYLEBONE, IN JULY, 1866:—

JULY.	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by Incineration of Solid Matter in previous column.		Ammonia.
	JUNE, 1866. 0°	JULY, 1866. 0°	JUNE, 1866. 0°	JULY, 1866. 0°	0°
Distilled Water					
West Middlesex water	18·80	15·48	0·68	0·52	....
Grand Junction water	18·76	16·80	0·73	0·56	....
Pump in Market Street	....	87·84	....	3·04	0·313
Pump in Bryanstone Square	....	83·92	....	3·92	0·425

* The loss by incineration of the solid matter represents the amount of organic and other volatile matters contained in 70,000 grains of water.

For the last three or four months there has been a gradual improvement in the quality of the water supplied to this parish by the Thames companies, and when we find that not much more than half a grain of organic impurity exists in a gallon, or 70,000 grains of this water, it must be admitted that, however polluted may be the source from whence it is taken, the state in which it is delivered to the consumer is very satisfactory, and speaks highly for the means employed in its purification. The water subjected to the above analysis is taken direct from the companies mains by means of a stand-pipe, and if the inhabitants of this parish could always obtain it in this condition, there would be but little occasion for that extra filtration or

boiling which becomes indispensably necessary when obtained from a dirty butt or cistern. Two improvements upon our present mode of supply seem to be necessary to the health, safety, and comfort of the population of London—the first is that it should be constant, and the second that it should come to us direct from the mains, without the intervention of those receptacles for storeage, where it receives such continuous pollution, and where grow those germs or organisms which, in seasons of epidemic, are believed to be so poisonous and fatal to life. But how to obtain this constant supply without serious waste is a difficulty yet to be surmounted. As now delivered to us, the waste of water is enormous, but without the check of an intermitting supply it would be ten times more so. Again, with regard to the abolition of cisterns, water-butts and ball-cocks, in the the absence of them, the pipe communicating with the main must, for the sake of domestic convenience, be brought into the house, and should this pipe become broken from frost or any other cause, the result would be a serious inundation. The great difference in the purity of the water as supplied to us by the companies, and that obtained from our parish pumps, is seen in the above table, and must show how necessary it was to cut off the water supply from the latter sources at the present time.

GAS EXPLOSION IN THE WESTMINSTER ROAD.—Between five and six o'clock on Thursday evening, a man in the employ of the London Gas Company, Nine Elms, was engaged on the premises of Mr. William John Otter, fishmonger, No. 35, Westminster Bridge Road, in repairing or regulating the gas-meter. From some unexplained cause, the gas rushed forth from the meter, and coming in contact with a light in the hands of the man, an explosion of an alarming nature followed. The man was violently thrown down, and before the daughter of Mr. Otter, who was in the shop at the time, could escape, she was met by the full blast of the explosion, and likewise thrown down, and the whole of the shop-front, fixtures, &c., where whirled into the street. The greatest alarm prevailed in the neighbourhood, owing to the fact of several firework manufacturers premises being in close proximity. From the small tenements in the rear of Mr. Otter's premises the people rushed forth, doubtless having full remembrance of the terrible scene which took place at the explosion of Madame Caton's house, which nearly faces the scene of the present disaster. In a short time, Sergeant Boxall, 12 L, and a body of police were on the spot, and the two injured persons were attended to by Dr. Donahoo, who found they were severely cut and bruised, and ordered their immediate removal to their homes. As soon as the alarm was raised messengers were despatched for the engines, and in a short time several attended, and by the prompt measures used the spread of further damage by fire was arrested. At the time of the explosion several persons were passing, and sustained injury from the falling *débris*, whilst others had very narrow escapes.

A GUTTER ON FIRE.—Shortly before eleven o'clock on Tuesday morning considerable excitement was caused among the tradespeople of Ludgate Hill, owing to the following singular occurrence:—It appears that a lad was carrying a couple of bottles of naphtha and paraffin oil over his shoulders, suspended by a piece of rope, when the ligature became either broken or untied, and the consequence was that the bottles fell to the ground and where smashed, when the oil ran along the gutter from the Dolphin Court entrance on the hill to the bottom. A boy, in order to try whether the liquid was really spirits, imprudently applied a lighted match to it, and in an instant the whole of the south side of Ludgate Hill presented a tremendous blaze, many of the residents imagining at first that one of the great gas-pipes had leaked, and that the vapour was on fire. Conductor Williams, of the Royal Society, rushed out with a number of pails of water, as well as several men employed by Messrs. Dean, next door, which they poured upon the burning spirits, and thereby succeeded in driving the blazing liquid down the sewer, and prevented any damage being done to the large establishments in the neighbourhood.

DUBLIN.—The first pipe of a new 36-inch main, which is to extend from the Alliance and Consumers Gas-Works, at Sir John Rogerson's Quay, to Carlisle Bridge, was laid by Mr. Gresham, the chairman of the company, on Saturday, the 18th ult., in the presence of the directors and chief officers of the company. The contractors for the pipes which are to form the new mains are Messrs. Edington, Son, and Company, of Glasgow; and their

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano . .	10 0 0	9 0 0	11 to 13
5000	20	Bahia (Limited) . .	20 0 0	4 0 0	16 10 0
1000	20	Do., preference .	20 0 0	10 0 0	27 10 0
750	20	Do., do., redeem.	10 0 0	10 0 0	12 10 0
30000	5	Bombay (Limited).	5 0 0	£5 intr.	3½ to 4
10000	5	Do., third issue .	4 0 0	£5 intr.	2½ to 3
10000	20	British, Limited (Norwich, Ruiscoates, Hanley, Tunstall & Sheiton (Potteries), Trowbridge, & Holywell.)	20 0 0	10 0 0	28 to 28½
12000	50	*Chartered*	50 0 0	10 0 0	61½ to 62
6000	50	Do.	35 0 0	10 0 0	42 to 42½
10000	20	*C. of London*, Ash.	20 0 0	2 0 0	26 to 28
10000	10	Do., B shares	10 0 0	4 0 0	7 to 7½
8000	10	Do., new shares.	10 0 0	10 0 0	12½ to 13⅛
25000	25	City of Moscow (L.) Colonial & General	17 10 0	£7 intr.	10½ to 12½
17490	25	*Commercial* . . .	25 0 0	10 0 0	32 to 32½
5000	20	Continental G. & W.	6 0 0	6 0 0	
2500	20	Continental Union.	20 0 0	8 0 0	17 to 18
17500	20	Do.	10 0 0	8 0 0	8 to 9
5827	5	County & Gen. (L)	5 0 0		
2000	5	Do., preference . (Pater, Pembroke, Ely, Lea Bridge, Northfleet, Walton, & Ware.)	5 0 0		
5800	10	*Crystal Pal. Dist.*	10 0 0	10 0 0	13 to 13½
5000	10	Do.	1 0 0	7 0 0	1 7 6
10000	10	Do., preference .	10 0 0	6 0 0	12½ to 13
5000	50	*Equitable*	50 0 0	10 0 0	70 to 71
4000	25	Do., new shares.	25 0 0	10 0 0	35 to 35½
23406	10	European (Lim.) .	10 0 0	10 0 0	12½ to 12¾
12000	10	Do., new shares.	5 0 0	10 0 0	6¾ to 6¾
		Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)			
20000	10	*Gt. Cent. Gas Cons.*	10 0 0	10 0 0	12½ to 13
5000	10	Hong Kong (Lim.)	10 0 0		8 to 10
26000	50	*Imperial*, old sh.	50 0 0	10 0 0	70 to 71
1300	100	Do., bonds . . .	£100	10 0 0	180 to 185
7000	25	Imperial Austrian.	10 0 0		
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	85 to 85½
		Impl. Mexican (L.)			
3000	40	*Independent* . . .	40 0 0	10 0 0	65 to 67
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
6886	50	*London*	50 0 0	10 0 0	68 to 70
5519	25	Do., 1st pref. .	25 0 0	6 0 0	28 to 29
568	50	Do., 2nd pref. .	50 0 0	6 0 0	
219	50	Do., 3rd pref. .	50 0 0	6 0 0	
18781		Do., 1st pref. sk		6 0 0	
11828		Do., 2nd pref. sk		5 0 0	
12000	5	Malta & Medit. (L.)	5 0 0	3 0 0	
30000	5	Oriental, Calcutta	5 0 0	3 0 0	5 to 5¼
30000	5	Do., new shares.	1 0 0	8 0 0	¾ to 1
10000	5	Ottoman (Limited)	5 0 0		2 to 4
10000	10	Parà (Limited) . .	10 0 0	£6 intr.	9½ to 9¾
27000	20	*Phœnix*	20 0 0	10 0 0	26½ to 26¾
3600	100	Do., new	20 0 0	7 10 0	21¼ to 22
144000	8k.	Do. (capit. profits)		5 0 0	80 0 0
5000	20	*Ratcliff*	20 0 0	10 0 0	26 to 28
20	20	Rio de Janeiro (L).	20 0 0	10 0 0	20½ to 21½
6959	5	Singapore (Lim.) .	5 0 0	3 0 0	
2000	5	Do., preference .	5 0 0	7 10 0	
		Shanghai			
4800	50	*Sth. Metropolitan*	50 0 0	10 0 0	75 to 77
15000	10	*Surrey Consumers*	10 0 0	10 0 0	13¾ to 14
10000	10	Do., new	5 0 0	10 0 0	6 to 6¼
9000	50	United General . (Dublin & Limerick)	50 0 0	4 12 0	28 to 28½
10000	10	*Victoria Docks* . .			
3000	10	*Wandsworth & Putney*	10 0 0	7 10 0	13¼ to 14
20000	10	Western (Limited) A shares.	10 0 0	10 0 0	14 to 14¼
10000	10	Do., B shares.	5 0 0	10 0 0	7 to 7½
10000	10	Do., C shares.	3 0 0	10 0 0	5½ to 6
20000	10	Do., D shares.	1 0 0		1¼ to 2
8000	5	*West Ham*	5 0 0	7 10 0	5 10 0
6000	5	Do., new shares.	3 0 0	7 10 0	3 18 0
551	10	West London Junction (Lim.). .	10 0 0	6 0 0	
520	10	Do., preference .	10 0 0	6 0 0	

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1, G.M.B.	3 15 0	2 15 0	2 12 6	3 10 0	4 0 0
1¼ and 2-inch Socket-pipes	7 10 0	6 0 0	6 15 0	6 15 0	7 10 0
3 and 3-inch ditto	7 0 0	6 0 0	6 5 0	6 10 0	7 0 0
4 and 5-inch ditto	6 10 0	5 10 0	5 15 0	6 0 0	6 10 0
6 inches and upwards ditto	6 5 0	5 0 0	5 10 0	5 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 0 0	—	5 5 0	5 10 0	6 0 0
Ditto, 2nd ditto, cold ditto	7 0 0	5 15 0	5 15 0	6 0 0	7 0 0
Tank-plates, ¼ thick and above	6 10 0	5 10 0	5 10 0	5 15 0	6 5 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 feet—per foot		1 0	0 10	0 7	0 5	0 4½
Ditto ditto, from 6 inches to 18 inches—each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows (wrought iron)	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, ditto	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

East Castle, Hauwells, Nettlesworth Primrose, and South Pelaw	7s. 0d.
Felling, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 3
Burnhope, Craghead, Charlaw, Derwent, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	7 6
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	7 9
Brancepeth, Dean's Primrose, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	8 0
Ramsay's Newcastle Cannel	20 0
Wigan Cannel (at Liverpool)	17 0
Scotch Cannel:—	
Boghead (at Leith)	30 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Lesmahago (at Glasgow)	29 0
Ditto (at Granton)	30 0
Arniston	27 6
Wemyss	20 0
Haywood, Wilsontown (at Granton)	18 0
Pirnie	14 0
Lothian's Cannel (at Leith)	27 6
Myles' Cannel	23 6

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—	
Chatham and Rochester	6s. 0d. to 6s. 3d
Cork	9s. 0d. to 9 6
Dover, Folkestne, & Ramsgte.	6s. 3d. to 7 0
Dublin	9s. 6d. to 10 0
Exeter Quay	8s. 3d. to 8 6
Ipswich	4 0
London (from Leith)	5 6
London (Pool)	4 3
Lowestoft and Yarmouth	4 9
Portsmouth & Southampton	7s. 0d. to 7 6
Plymouth	7s. 6d. to 8 0
Shoreham	6s. 9d. to 7 0
Whitstable	6 6
Weymouth	7s. 9d. to 8 0
Foreign.—Per Keel:—	
Barcelona	22 10
Bordeaux	13 10
Boulogne and Calais	7 15
Cadiz	13 0
Cronstadt	—
Copenhagen	7 15
Genoa	18 0
Hamburg	8 0
Havre de Grace	9 5
Leghorn	16 0
Lisbon	£13 10s. to 14 0
Rotterdam	£7 15s. to 8 0
Stettin	10 0
Trieste	21 10
Venice	23 0

SUNDRIES.

Best Nstle. Fire-bks., p. 1000, £2 10s. to £2	15 0
Cliff's Fire-bks. (at Wortley), p. 1000.	2 15 0
Ingham's ditto (at Wortley), p. 1000..	2 15 0
Fire-clay Reterts, p. ft. run, 5s. 6d. to	0 7 0
Tough Cake Copper, p. ton	86 0 0
English P. g Lead, p. ton	20 0 0
Welsh Bar Iron (in London), p. ton..	6 15 0
Foreign Spelter, p. ton	19 15 0
English Block Tin, p. ton	88 0 0
Banca, p. ton	85 0 0
Tarred Rope Yarn, p. cwt.	1 0 0

representative, Mr. Robert Simpson, and Mr. O'Dell, chief inspector of the Alliance and Consumers Gas Company, superintended the laying of the first pipe, an operation carried out by a large staff of the company's workmen. The pipe was a huge object, as seen suspended from the crane. The length of the main from Carlisle Bridge to Sir John Rogerson's Quay will be 1600 yards, and this length of pipe will contain not less than 33,000 cubic feet of gas. So large a main pipe was hitherto unknown in Dublin, or in any city in Ireland, and by its establishment the company will be enabled to supply an unlimited amount of gas to all their customers with the greatest facility. When the pipe was lowered into its place in the trench dug for its reception, Mr. Gresham, after the usual formalities, declared it well and truly laid, amid the cheers of the workmen, and expressed a hope that the new main, when completed, would be found beneficial to the gas consumers of Dublin. Subsequently the directors and chief officers of the company were entertained by Mr. Robert Simpson at a *déjeûner* in the Gresham Hotel.

Advertisements.

FOR SALE, at any reasonable price, the whole of the IRONWORK belonging to the small Gas-Work at the Sussex County Lunatic Asylum, it being no longer required.

It consists of 6 retorts, the gasholder, 26 feet diameter by 13 feet deep, &c., &c. All the ironwork, excepting the retorts and holder, is in good condition.

May be seen at the above Asylum, Hayward's Heath, and further particulars may be obtained of Mr. H. CARD, Surveyor, LEWES.

Aug. 21, 1866.

TO GAS MANAGERS, &c.

FOR SALE, a "JONES'S PATENT EXHAUSTER," with 7-inch inlet and outlet pipes, and self-acting hydraulic bye-pass, fitted complete. Has only been a short time in use.

For further particulars apply to JOHN POYNTER and SON, 72, Great Clyde Street, GLASGOW.

TO GAS COMPANIES AND ENGINEERS.

TO be Disposed of, by the Falmouth Gas, Coal, and Coke Company, Limited, a Cast-Iron GASOMETER-TANK, 45 ft. diameter by 14 ft. deep, in excellent condition—estimated weight about 78 tons; together with the bolts and nuts, belt-hoops, &c., belonging thereto. Now lying at Penryn, very convenient for shipment or delivery by railway.

Also with the above, or separately, the Framing and Angle Iron Curbs for a telescope gasholder to suit the above tank. Also the pulleys, chains, guide-wheels, bars, &c.

Application to be made to Mr. W. WARN, Secretary to the Company, Falmouth, Cornwall.

Dated Falmouth, June 23, 1866.

FRAUDS ON GAS COMPANIES.

To the Phœnix Gaslight Company, London.

The "Dover Castle," Little Surrey Street, Blackfriars Road.

Gentlemen,—I hereby apologize in this public newspaper for having knowingly connected a surreptitious pipe to your supply service without a meter, you having cut off the same owing to non-payment. By means of this I was enabled to light up this house for seven nights, I being unable to pay, and you being unable to ascertain the quantity of gas consumed.

I have also to express my gratitude for your lenity in not taking criminal proceedings against me, as, in consequence of my present bankruptcy and my not having yet obtained a certificate, I have no money to pay a fine, and I must have been imprisoned for a lengthened period.

I am, Gentlemen, your very humble servant,

(Signed) SAML. C. WALLER.

Aug. 31, 1866.

TO GAS COMPANIES.

MR. ALEXANDER RITCHIE, who for upwards of Twenty Years acted as Engineer, Manager, and Treasurer of the Greenock Gas-Works, which during his management became one of the best paying works in the kingdom—Mr. R. having cleared upwards of TWENTY-FIVE per cent. upon the capital—has to offer his services to any Gas Company in want of a MANAGER.

Communications addressed to Mr. RITCHIE, at 30, Birslam Street, GREENOCK, will meet with immediate attention.

Greenock, Aug. 24, 1866.

TO GAS COMPANIES.

WANTED, a Situation as Manager of a Gas-Work. Is quite capable of taking the entire management in all its branches—viz., the working of clay and iron retorts—has had 16 years experience in works, and has been for the past 12 years Manager. No objection to go abroad. Can do the drawings, &c., connected with works. Good testimonials.

Address, Messrs. JAMES MILNE and SON, Gas Engineers, EDINBURGH.

WANTED, a Situation as Manager of a Gas-Work. Is quite capable of taking the entire management, and has a thorough knowledge of laying mains and services, fixing and repairing meters, and fitting houses. No objection to go abroad. Good references.

Address, A. E. FOWLE, Westerham, KENT.

WANTED, by the Advertiser, a Situation either as INSPECTOR, ASSISTANT MANAGER, or MANAGER of a small Gas-Work. Good testimonials.

Address, C. J., 23, Baxter Road, Essex Road, ISLINGTON.

WANTED, by a young Man, aged 21, a Situation as CLERK. Has been six years in Gas Companies Offices.

Address, A. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GEORGE GLOVER & CO.'S
PATENT DRY GAS-METERS.

The advantages of these Meters are best appreciated by a consideration of the evils they avert. The more prominent of these evils are the following:—

1. Inaccurate measurement, and varying registration.
2. Jumping of the lights, and their sudden extinction.
3. Escapes of gas through the plugs being left out, or imperfectly secured, when the Wet Meter has been replenished with water.
4. The gas passing without being registered at all.
5. The temptations and facilities to fraud which it is notorious the Wet Meter presents.

CLASSES X. & XXXI.

6. The damage to house property which the impracticable attempt to keep the lights from jumping, by giving all the pipes a gradual ascent from the Meter, so as to admit of the water trickling back into it, necessarily occasions.
7. The waste of gas from the higher pressure required to work Wet Meters, the possibility of the water freezing, and their axles and moving parts becoming corroded.

These faults, characteristic of the Wet Meter, and fruitful in annoyance, interruption to business, pecuniary loss, and danger, are entirely averted by the use of George Glover and Co.'s Patent Dry Gas-Meter.

It is, besides, more durable than the Wet Meter; and they maintain it in good working order for five years, free of cost to the purchaser; and for any number of years, at half the expense at which the Wet Meter can be maintained.

As regards accurate measurement, correct registration, the absence of temptation to fraud, safety, convenience, and economy, the superiority of their Dry Meter is admitted; and it has come more rapidly into use, both in this country and abroad, than any Meter hitherto manufactured.

The prices may be compared favourably with those of any meters in the market; and they are lower than most.

List of Prices, and all Particulars, may be obtained on Application.

RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
127, BOULEVARD DE MAGENTA, PARIS; AND 15, MARKET STREET, MANCHESTER.

THE
GAS-METER COMPANY, LIMITED,
(LATE CROLL, RAIT, & CO.,)

Beg to intimate that the printed report of the official inspector of Gas-Meters for the City of Manchester for the year ending **1864** shows the following comparison:—

NEW METERS TESTED.

Of the Gas-Meter Company, Limited . .	Dry . .	1116	
	Wet* . .	1292	
Total		——	**2408**
Of George Glover and Co.	Dry	383	

* The Unvarying Water-Line Gas-Meter, in regard to which the following extract from said report refers:—"The visiting justices will perceive, from a comparison of the tables now appended with those of last year (viz., 1863), *that there has been a large increase in the number of new wet meters tested, owing to the Gas Committee having substituted the wet for the dry in the case of hired meters.*"

Extract from printed report of the said official inspector for the year ending 1862, shows the following comparison:—

Croll, Rait, and Co., per centage of error on the number tested . . 8·671
George Glover and Co. „ „ „ . . 22·727

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gasfittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gasfittings and Gas Apparatus.

MARTIN'S
LEE MOOR PORCELAIN FIRE-BRICKS,

Containing no Lime, and only ·45 of Oxides, resist the strongest heats, and will last for Gas-Works longer than any others.

Samples and prices sent, and the highest references given, on application to

MARTIN BROTHERS,

ST. AUSTELL, CORNWALL.

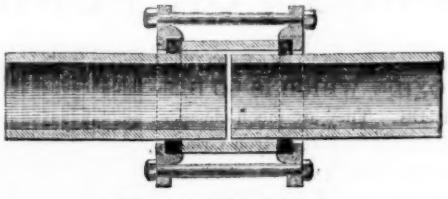
WALTER FORD,

159, GRAY'S INN ROAD, LONDON.

MANUFACTURER OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, &c. &c.

Sole Manufacturer of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.

DR. NORMANDY'S
PATENT PIPE-JOINTS.



SOLE MANUFACTURERS—

A. NORMANDY and CO., Engineers and Ironfounders,

HOLLY BUSH PLACE, BETHNAL GREEN ROAD, LONDON, N.E.

Also Sole Manufacturers of the Patent Marine Aërated Fresh-Water Apparatus, Steam Pumps Steam Winches, &c.

These Joints have been in use nearly three years on gas-mains, and are still perfectly sound. They have also been proved quite sound under a pressure of 680 feet head of water.

The advantages which these Joints offer are economy, perfect soundness and durability, ease and rapidity of application, use of perfectly plain pipes, so that a tight Joint may be made with cut pipes, even though the ends do not come close together. Any ordinary labourer is capable of securely fixing them.

These Joints are particularly applicable to gas, water, and suction pipes, and remain permanently sound; they are cheaper than the socket-joint, as they save the lead, the gasket, the iron forming the socket (which in a 3-inch main amounts to 10 lbs.), and the fire for melting the lead. There is also considerable saving of time, more than four Joints being made in the time required for making only one of the others, and by unscrewing the bolts, a pipe can be removed and replaced with the greatest facility.

By means of these Joints, which are made of all sizes, pipes made of either wrought or cast iron, copper, lead, tin, earthenware, glass, bitumen, gutta-percha, suction-hose, &c., may be rapidly and soundly united, and taken apart with facility.

TO GAS COMPANIES AND CONTRACTORS.

FOR SALE, 4 Purifiers, 9 ft. square by 2 ft. deep, with hydraulic centre-valve, by-pass valves, and 6-in. connexions, vertical condensers, with by-pass, scrubber, and washer; also a STATION-METER and GOVERNOR. The whole of the above are being removed to make room for larger apparatus, rendered necessary by the rapidly increasing business of the Company.

For further particulars, apply to Mr. A. C. FRASER, Manager, Gas-Works, COLCHESTER.

Gas Company's Office, Colchester, Aug. 14, 1866.

METROPOLITAN BOARD OF WORKS.

THE CARRIAGE & DEPOSIT OF DANGEROUS GOODS ACT, 1866, AND THE STOREAGE OF PETROLEUM ACT, 1862.

WHEREAS, by the Carriage and Deposit of Dangerous Goods Act (1866), it is provided that the goods or article commonly known as NITRO-GLYCERINE or GLONOINE OIL shall be deemed to be specially dangerous, and that its storeage in any quantity shall be regulated by licence under the Petroleum Act (1862): And whereas the Metropolitan Board of Works is the local authority for the metropolis (exclusive of the City of London and certain dock and harbour authorities), and authorized by the said Petroleum Act to grant licences for the storage of dangerous goods: Therefore the said Board do hereby give NOTICE that applications must be made to the Board for LICENCES to receive or store specially dangerous goods, or any quantity thereof, subject to the requirements of and according to the said Statutes.

By order,

(Signed) JOHN POLLARD,
Clerk of the Board.

Spring Gardens, Aug. 10, 1866.

CAST-IRON Retorts, Socket Pipes, with Syphons and all requisite Connexions, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.

PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas-Works, in stock, on wholesale prices, at

Mr. LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street,
LONDON.

AUCHINHEATH, Lesmahago, Gas COAL, known in the market for the last fifty years as a first-class gas coal.

JAMES FERGUSON and CO.,

Sole Lessees of the Auchinheath Coal-Field, are prepared to ship the above at Glasgow, Greenock, and Ardrossan, on the west coast of Scotland; and at Granton or Leith, in the Firth of Forth, on the east coast. Also to forward them to any railway-station in Scotland or England.

Price and other particulars may be learned by addressing

JAMES FERGUSON and CO.,
GAS COAL WORKS,
LESMAHAGO.

GARSIDE'S Registered Tube-Vice and improved Main Drilling Clips may be had from the maker.

For drawings and prices apply to SAMUEL GARSIDE, Gate Field Iron-Works, ASHTON-UNDER-LYNE.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET,

EDINBURGH.

Established 1840.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS,

PLAIN, GALVANIZED, & ENAMELLED, for Gas, Steam, and Water, from ¼ in. to 6 in. bore.

STOCKS, TAPS, and DIES, GUN METAL GLAND-COCKS, WATER-GAUGES, &c.;

PATENT LAP-WELDED IRON TUBES,

For Locomotive and Marine Boilers, &c.

LONDON WAREHOUSE—No 66, QUEEN STREET, E.C.

CAST-IRON PIPES, RETORTS, AND GENERAL CASTINGS.

Lowest current prices, quoted either f. o. b., or delivered in the Thames, on application to

THE MANAGER, MILTON IRON-WORKS, WEST HARTLEPOOL.

E. J. & J. PEARSON,

DELPH & TINTAM ABBEY FIRE-CLAY & BRICK-WORKS,

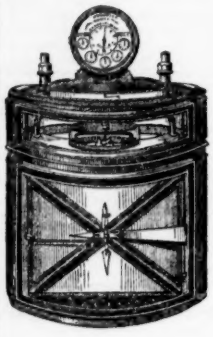
STOURBRIDGE,

PROPRIETORS OF

BEST GLASS-HOUSE POT & CRUCIBLE CLAY;

MANUFACTURERS OF

GLASS-HOUSE POTS, CRUCIBLES, GAS-RETORTS, & FIRE-BRICKS OF EVERY DESCRIPTION.



N. DEFRIES'S

PATENT DRY GAS-METERS,

WITH

THREE DIAPHRAGMS & ROTARY VALVES,

ARE

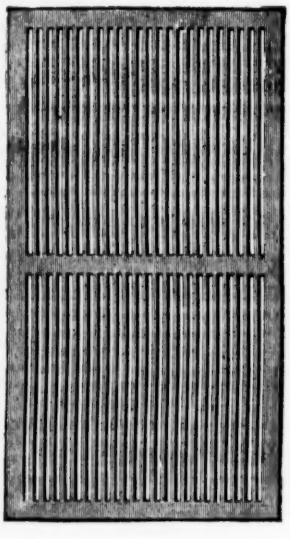
UNIVERSALLY USED IN ENGLAND AND THE COLONIES.

The MOST LIBERAL ALLOWANCE for WET GAS-METERS in EXCHANGE for DRY.

WORKS: DIANA PLACE, EUSTON ROAD.

WALKERS'

WOOD SIEVES OR GRIDS FOR PURIFIERS.



These celebrated Grids are used for and UNAFFECTED BY EITHER LIME OR OXIDE, WHICH IS SO DESTRUCTIVE TO IRON GRIDS. They are much cheaper, and VERY MUCH MORE DURABLE than Iron Grids.

DRAWING No. 1

Shows our most firm and durable kind of Wood Grids.

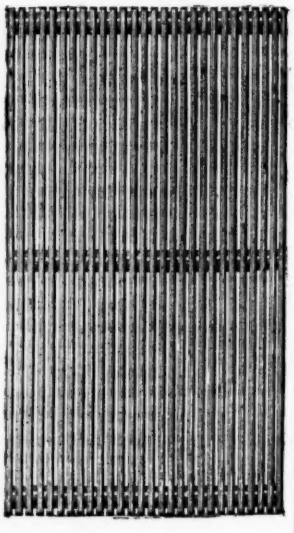
They are made BEVEL IN SECTION FOR KEEPING CLEAN, and for LARGER AREA OF GAS PASSAGE through them.

They have outside frames of HARD UNDAMAGEABLE WOOD, which enables them to be COMPRESSED UNDER HEAVY PRESSURE, PROTECTS THEM FROM ROUGH USAGE, and binds them together with STRENGTH AND SOLIDITY.

DRAWING No. 2

Shows our second quality of Wood Grids of a less substantial and cheaper kind. They are made parallel in section, and are suitable for lighter work.

Prices on application to



C. & W. WALKER,

Midland Works, Donnington, near Newport,

SHROPSHIRE; AND

Little Sutton Street, London, E.C.

No. 1.

No. 2.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

GAS & GENERAL ENGINEERING OFFICES,
53 FREDERICK STREET, EDINBURGH.

MR. JOHN ROMANS, Civil and Practical Engineer, may be consulted at the above address on all matters pertaining to Gas-Works, Water-Works, and other Engineering questions.

Plans and Specifications Furnished, Works Erected and Repaired, or taken on Lease for a term of years.

Mr. Romans is also agent in Edinburgh for supplying High-Classed Scottish Cannel Coal and Fire-Clay Goods.

FRASER'S PATENT RIBBED CAST-IRON RETORTS are being introduced at the Gas-Works, Derby, Shrewsbury, Portsea, Nottingham, Syston, Whitwick, Barrow-in-Furness, Seaham, Risborough, Leighton, Loughborough, Corwen, Castle Donnington, Kegworth, Royston, Woking, Swadlincote, Rugby, Carlow in Ireland, Stornoway, N.B.; also at Gibraltar and Montreal, &c.

Apply to Mr. A. C. FRASER, Gas-Works, COLCHESTER.

OXIDE OF IRON,
We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

FRANCIS RITCHIE & SONS,
BELFAST.

INTERNATIONAL EXHIBITION,
1862. CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE,

STOURBRIDGE FIRE-CLAY WORKS.

E. BAKER & CO.,
24 WHARF, HARROW ROAD, PADDINGTON, W.

FIRE-BRICKS, LUMPS, SQUARES, and TILES of all dimensions.
GAS-RETORTS always in stock.
GARDEN EDGINGS of various patterns.
ORNAMENTAL BUILDING BRICKS.
GRATE BACKS in various designs.
Contracts entered into to set Retorts, erect Furnaces, &c.
Shipments on the shortest notice.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS,
&c. &c.
SCOTSWOOD FIRE-BRICK WORKS,
NEAR
BLAYDON-ON-TYNE.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire-Bricks, and every description of Fire-Clay Goods.

HARRIS and PEARSON,
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY
MANUFACTURERS OF
FIRE BRICKS, GAS RETORTS, &C.
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.
Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.
NB A quantity of best Clay Retorts in stock, viz.—Circulars, 14 inches, 15 inches, 16 inches.
D's, 16×12, 15×14, 20×16, 16×18.

HANCOCK'S INDIA-RUBBER GAS-TUBING.
All sizes, from ¼ in. to 4 in. diameter and upwards.
Also,
INDIA-RUBBER BAGS for GAS-MAINS.
WASHERS for GAS and STEAM JOINTS.
VALVES (pure solid Rubber) for STEAM-ENGINES.
PACKING (Roll or Sheet) for STEAM-ENGINES.
STRAPS (Rubber and Canvas) for DRIVING MACHINERY.
HOSE-PIPES to convey HOT or COLD WATER.
COKE-HOSE, made specially for rough usage.
GAUGE GLASS RINGS and WASHERS.
SUCTION and DELIVERY HOSE-PIPES for PUMPS, FIRE-ENGINES, BREWERIES, and FACTORY purposes.
BRASS JETS, STOP-COCKS, SPREADERS, and UNION CONNECTING-JOINTS fitted to ditto.
Illustrated Price-Lists on application.

JAMES LYNE HANCOCK,
Vulcanized India-Rubber Works,
GOSWELL MEWS, AND 266, GOSWELL ROAD,
LONDON, E.C.

Trade Mark. **THE MEDAL FOR 1862.**
THE ONLY PRIZE MEDAL AWARDED FOR TUBES AND FITTINGS.

CROWN TUBE-WORKS,
WEDNESBURY, STAFFORDSHIRE.
WAREHOUSE—81, UPPER GROUND ST., LONDON.

JAMES RUSSELL & SONS,
Patentees and First Makers of Wrought-Iron Tubes.

W. J. HOLLANDS,
IRON MERCHANT,
31, BANKSIDE, LONDON, S.E.
SOCKET, FLANGE, HOT-WATER PIPES, AND ALL CONNEXIONS; RETORTS, HYDRAULIC MAIN, LAMP-COLUMNS, &c.; AND EVERY DESCRIPTION OF CASTINGS AND WROUGHT-IRON-WORK FOR GAS AND WATER-WORKS, STEAM, AND GENERAL PURPOSES.
N.B.—All goods kept in stock, and supplied at wholesale prices. Estimates given, and orders by post punctually attended to the same day.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.
Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, Ghent.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications, addressed to J. SUGG and CO., GHENT, will receive immediate attention.

ESTABLISHED 1827.
JOHN BEVERLEY and SON,
MARK LANE, LEEDS.
Manufacturers of Patent Metallic Wet Gas-Meters, Station-Meters, Experiment-Meters, Governors, Pressure-Gauges, Syphon-Pumps, &c.
Inventors and sole manufacturers of Beverley's double-cased Gas Cooking Apparatus, unequalled in economy, comfort, and cleanliness.
Meters of any maker altered and put into complete repair, to meet the requirements of the Sale of Gas Act

---

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

D. BRUCE PEEBLES,
Gas-Meter Manufacturer,
FOUNTAINBRIDGE,
EDINBURGH.

BEST AND HOBSON,
LATE
ROBERT BEST,
100, CHARLOTTE STREET, BIRMINGHAM,
Manufacturers of
CHANDELIERS, PENDANTS, BRACKETS,
Brass and Iron Gas-Fittings, Steam and Water-Cocks &c., &c.
Also,
PATENT WELDED IRON TUBES,
For Gas, Steam, Water, and other purposes.
GAS APPARATUS OF EVERY DESCRIPTION.
High-pressure Water-Valves and Cocks, &c., &c.
Plumbers Brassfoundry,
BRASS, COPPER, COMPOSITION, AND LEAD TUBES.
Works: Birmingham, and Great Bridge, Staffordshire.

ALFRED PENNY, Gas and CONSULTING ENGINEER,
WENLOCK IRON WORKS,
21 & 22, WHARF ROAD, CITY ROAD, LONDON.
Mr. PENNY having had a large experience in the construction, alteration, and management of Gas-Works, begs to inform the Directors of Gas Companies that he may be consulted on all matters appertaining thereto. He also manufactures Gasholders, Purifiers, and all the various apparatus used in Gas-Works, and keeps in stock Retorts and Mouthpieces, Socket-Pipes, Bends, Branches, T-pieces, &c. &c.
Plans, Specifications, and Estimates prepared.

FREDERICK RICHARDS,
CONSULTING AND GENERAL ENGINEER.
WILMSLOW, CHESHIRE.
Plans, Specifications, and Estimates made for New or the Alteration of existing Gas-Works.
Gas-Works leased, or Estimates given for the Manufacture of Gas per Contract for a term of years.
Manchester Office: 8, Cateaton Street.

GAS COAL.
MESSRS. RICHARD EVANS & CO.,
Haydock Collieries, near St. Helen's, are prepared to SUPPLY their best GAS COAL to Gas Companies on favourable terms.
This Coal is extensively used by some of the largest Gas Companies in the Kingdom.
It produces 9,400 cubic feet of 17-candle power, and yields 13 cwt. of coke per ton.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

B. CARPENTER'S Improved Wood SIEVES for Gas-Purifiers.
Works: 14, John Street, Pentonville Road, LONDON, N.
The above sieves are used by the principal gas companies in London and the country. Their utility, durability, and cheapness combined, render them superior to all others.
Testimonials from gas engineers who have tested their qualities forwarded on application.
All orders punctually attended to, and estimates given if required.

MR. G. W. STEVENSON, C.E., F.G.S.,
(for the last 10 years Engineer to the Corporation of Halifax), may be consulted upon all matters connected with the construction of gas-works, and the manufacture and supply of gas; also upon the construction of water-works and the supply of water to towns; and also in respect to the sewerage of towns, and sanitary works generally.
Offices, Waterhouse Street, HALIFAX, and 14, Park Street, WESTMINSTER.

CATHELS'S Patent Four-Way Disc GAS-VALVES, applied to Purifiers, Gasholders, or other apparatus, save from ONE-HALF to TWO-THIRDS the number of ordinary Valves and Connexions. They are simple, strong, and durable; and having no ground faces or rubbing surfaces, cannot get set fast however long they may remain unmoved. The direction in which the Gas is passing can also be seen at a glance.
Descriptive Circular, Prices, &c., furnished on application to the Manufacturers, Messrs. GUEST and CHRIMES, ROTHERHAM.

J. T. B. PORTER & CO.,
GAS ENGINEERS,
MANUFACTURERS AND CONTRACTORS FOR GAS-WORKS
Of any extent at Home and Abroad,
GOWTS BRIDGE WORKS, LINCOLN,
AND
JOHN STREET, ADELPHI, LONDON, W.C.

SAMUEL CUTLER, Gasholder MAKER and CONTRACTOR
For Tanks, Roofs, Purifiers, Condensers, Erection and Alteration of Works and every description of GAS APPARATUS.
PROVIDENCE IRON WORKS,
MILL WALL, POPLAR, LONDON, E.
Main Laying and Gas-Works erected complete.

WALTER MABON & CO.,
Engineers,
ARDWICK IRON-WORKS,
FAIRFIELD STREET, MANCHESTER,
MANUFACTURERS OF
IRON TANKS, GASHOLDERS,
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
WROUGHT AND CAST-IRON GIRDERS.

DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

J. STRACHAN,
CONSULTING GAS ENGINEER,
68, KING'S ROAD, READING,
Having had many years experience in the adjustment and regulation of the supply of gas to public lamps, begs to offer his services to Gas Companies, Corporations, or Boards of Health, on reasonable terms.
Contracts taken for laying mains, general repairs, and extension of gas-works.

NOTICE OF REMOVAL.

THE BUSINESS OF

WILLIAM SUGG,

GAS ENGINEER,

is removed to his New Factory,

VINCENT WORKS, VINCENT STREET,

REGENT STREET, WESTMINSTER.

WATER AND GAS PIPES,

AND EVERY DESCRIPTION OF CASTINGS.

CLARIDGE, NORTH, AND COMPANY,

PHŒNIX FOUNDRY, BILSTON.

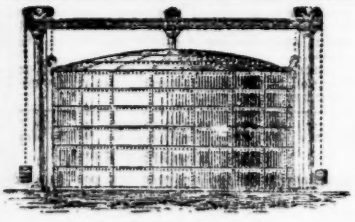
KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS.

KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them FREE FROM CRACKS AND CORRECT IN FORM. By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

Retort Ovens, Fire-Bricks, Guards, Saddles, Rabbitted Bars, Flues, and Quarries, are all Manufactured of the same quality of Clay.

Every Retort and Brick is branded "King Brothers, Stourbridge.'



IMPROVED GAS APPARATUS,

FOR TOWNS, VILLAGES, &c.

INVENTED AND MANUFACTURED BY

W. C. HOLMES & CO.,

WHITESTONE IRON-WORKS, HUDDERSFIELD.

WILL BE SENT ON APPLICATION:—

PLANS, SPECIFICATIONS, and PRICES of GAS APPARATUS;

PLANS, SPECIFICATIONS, and ESTIMATES of the requisite BUILDINGS for each size of Apparatus;

PLANS of the IMPROVED ANNULAR CONDENSERS;

PLANS of the COMBINED PURIFYING APPARATUS, so eminently adapted for Exportation.

LONDON OFFICES—56, GRACECHURCH STREET, CITY.

*** *Please address letters to the Works at Huddersfield.*

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.'s Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

TO GAS COMPANIES AND THE TRADE.

NOTICE OF REMOVAL IN CONSEQUENCE OF THE LATE FIRE.

J. DEFRIES AND SONS,

Gas Engineers, and Manufacturers of

CRYSTAL, BRONZED, & ORMOLU Chandeliers;

IMPROVED CRYSTAL STAR & SUN LIGHTS;

VESTIBULES, and every description of Gas-Fittings.

Temporary Show-Rooms:—16 & 17, COMMERCIAL STREET, WHITECHAPEL,

Five Minutes Walk from their late Establishment, 147, HOUNDSDITCH.

J. D. & SONS beg most respectfully to inform Gas Companies and the Trade that their CITY SHOW-ROOMS are now complete with every description of Lighting Mediums, including Registered Designs of Mediæval Gas-Fittings, Crystal, Bronzed, Ormolu, and Electro-Plated Chandeliers, Brackets, Vestibule-Lights, Bronzed and Gilt Statuettes.

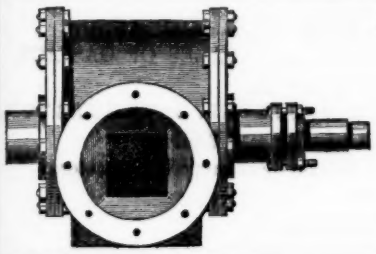
Special Designs prepared in perfect accordance with architectural arrangements. Estimates furnished for the Lighting and Fitting up of Theatres, Music-Halls, and Public or Private Buildings with Gas.

GAS-MOONS of the Newest Designs.

The PATENT GAS-REGULATOR and PURIFIER reduced to **6s. 6d. per dozen.** *Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for* 1865-66 *are now complete.*

Works: LONDON and BIRMINGHAM.

The CRYSTAL CEILING, with Ventilating Apparatus, manufactured by J. Defries and Sons for the Strand Music-Hall.



ROTATORY AND DOUBLE-ACTING GAS-EXHAUSTERS,

with many recent improvements, from 1500 to 150,000 cubic feet per Hour.

JAMES BURTON, SONS, & WALLER,

MAKERS OF ENGINES, MACHINERY, and IRONWORK for GAS-WORKS,
efficient and durable TAR, LIQUOR, and SYPHON PUMPS,
GAS-VALVES, with or without Wedges, worked with powerful Worm and Rack,
SELF-ACTING BY-PASS VALVES, with Lid and Relieving Lever,
ROTATORY, TUMBLER, and CAPILLARY WATER DISTRIBUTORS for SCRUBBERS.
SMALL-SIZE EXHAUSTERS KEPT IN STOCK.

JOHN'S PLACE, HOLLAND STREET, SOUTHWARK, LONDON, S.E.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER.

OFFICES REMOVED TO

19, NORTHUMBERLAND STREET, CHARING CROSS.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE & MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS in which the Gasholder cannot tilt and cause accidents.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letter-press on the construction of Works, post free, 2s. 6d.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—ARTIZAN.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and SALT-GLAZED DRAIN-PIPES.

LONDON AGENT:

MARCUS BOURNE NEWTON,

Wharf No. 4, inside Great Northern Goods Station, King's Cross

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

THE

GAS-METER COMPANY, LIMITED,

A. ANGUS CROLL, C.E., Chairman.

GEORGE RAIT, MANAGING DIRECTOR. T. G. BARLOW, C.E., CONSULTING ENGINEER.

CROLL'S DRY GAS-METER,

(Invented and Patented in 1844, since which time 200,000 of these Meters have been manufactured by Mr. CROLL,)

Obtained **PRIZE MEDALS** at the EXHIBITIONS of London, 1851, of New York, 1853, and Paris, 1855.

IMPROVED in 1858,

And was awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for

"GOOD CONSTRUCTION and SOUND WORKMANSHIP."

Now manufactured by the GAS-METER COMPANY, LIMITED, KINGSLAND ROAD, LONDON; and, for the purpose of obtaining greater accuracy in all its parts, the most perfect machinery has been adopted, "By which the construction of the Meter is much simplified, while its liability to get out of order is diminished." (See report of T. G. BARLOW, Esq., C.E.)

ALEXANDER WRIGHT,

55 and 55A, MILLBANK STREET, WESTMINSTER, S. W.,

MANUFACTURER OF

COMPENSATING & OTHER WET & IMPROVED DRY GAS-METERS,

Of the best material and workmanship, carefully adjusted to meet the requirements of the SALES OF GAS ACT.

STATION-METERS & GOVERNORS,

WRIGHT'S REGISTERING PRESSURE-GAUGE, EXHAUSTER REGISTER, & REGULATOR;

STANDARD TEST GASHOLDERS;

Consumers' Governors; Inspectors' Pocket, King's, and all other kinds of Pressure-Gauges; Thermometers for Condensers, Pressure Registers, &c., &c.

EXPERIMENTAL TESTING APPARATUS,

Employed by the best experimenters in this country and on the continent, and by the Gas Testers in the London districts.

PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, BI-SULPHURET OF CARBON TEST, THOMPSON'S BROMINE AND HEATING POWER OF FUEL TESTS, IMPROVED ALKALIMETER, EXPERIMENTAL METERS AND GOVERNORS, MINUTE CLOCKS, &c., &c.

"ANALYSIS OF GAS FOR PRACTICAL MEN,"

New and Enlarged Edition, with "Gas-Meter Testing under Sales of Gas Act," p.p. 25 Stamps.

R. LAIDLAW & SON,

GAS ENGINEERS, IRON & BRASS FOUNDERS

Alliance Foundry, 147, East Milton Street, and Barrowfield Iron-Works,

GLASGOW;

AND AT SIMON SQUARE, EDINBURGH;

MANUFACTURERS OF

STATION & CONSUMERS METERS, ALL SIZES;

WROUGHT-IRON TUBES, FOR GAS, WATER, & STEAM; CAST-IRON RETORTS & PIPES,

HYDRAULIC MAINS, CONDENSERS, WASHERS, SCRUBBERS, PURIFIERS, & TANKS.

GASHOLDERS;

GOVERNORS, SLIDE-VALVES, &c.;

WROUGHT & CAST IRON ROOFS & HOUSES.

Contractors for Gas-Works of any Magnitude. *Plans, Specifications, and Estimates furnished.*

LONDON ESTABLISHMENT—190, STRAND.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE BLACK & GALVANIZED. COPPER. TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—65s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

Large Pattern Books with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, September 4, 1866.